

Preliminary Staff Assessment (Part 2)

**THREE MOUNTAIN
POWER PROJECT**

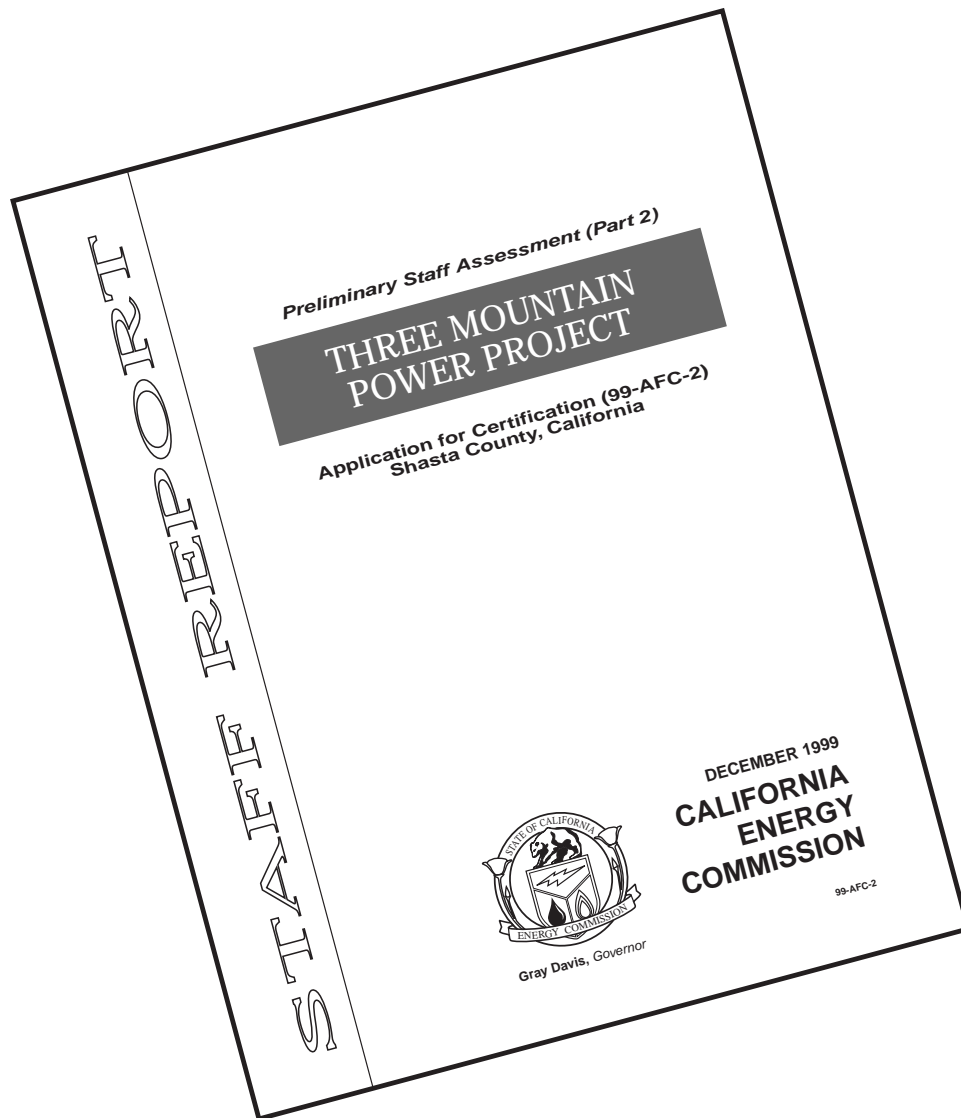
**Application for Certification (99-AFC-2)
Shasta County, California**



Gray Davis, Governor

**DECEMBER 1999
CALIFORNIA
ENERGY
COMMISSION**

99-AFC-2



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THREE MOUNTAIN POWER PROJECT

EXECUTIVE SUMMARY

INTRODUCTION

This Preliminary Staff Assessment (PSA) Part 2 contains the California Energy Commission (Energy Commission) staff's evaluation of the Three Mountain Power, LLC's (the applicant) Application for Certification (AFC) (99-AFC-2) for the technical areas: **Air Quality, Alternatives, Soils and Water Resources** and **Worker Safety and Fire Protection**. Part 1 of the PSA was filed on December 2, 1999.

BACKGROUND

On March 3, 1999, the applicant filed an AFC with the Energy Commission to construct and operate the Three Mountain Power Project (TMPP). On April 14, 1999, the Energy Commission determined that the application should not be accepted due to data inadequacies. On June 4, 1999, the applicant filed supplemental information to address the list of data inadequacies adopted by the Energy Commission. The Energy Commission deemed the application complete at its June 23, 1999 business meeting. The analyses contained in this PSA are based upon information from: 1) the AFC; 2) subsequent amendments; 3) responses to data requests; 4) supplementary information from local and state agencies and interested individuals; 5) existing documents and publications; and 6) independent field studies and research.

PROJECT DESCRIPTION

The TMPP will be located in northeastern Shasta County, approximately 1 mile northeast of Burney, California, and 45 miles east of Redding, California. The site is located on a 40-acre site that is zoned for industrial use. Approximately one-third of the site is currently developed and used by Burney Mountain Power, which operates a 10 megawatt (MW) biomass-fueled power plant. The site is located on State Route 299 northeast of Black Ranch Road between the towns of Burney and Johnson Park, (Township 35 North, Range 3 East, on Assessor's Parcel Number 030-390-36). See **PROJECT DESCRIPTION** Figures 1 and 2 for the location of the project.

A detailed project description is contained in the PSA Part 1 filed on December 2, 1999. The PSA Part 1 contains staff analysis of: Need Conformance, Socioeconomics, Public Health, Biological Resources, Hazardous Materials Handling, Waste Management, Transmission Line Safety & Nuisance, Geology and Paleontology, Land Use, Facility Design, Traffic and Transportation, Reliability, Noise, Efficiency, Visual Resources, Transmission System Engineering, Cultural Resources and General Conditions/Compliance Monitoring.

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PRELIMINARY STAFF ASSESSMENT – PART 2
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AIR QUALITY

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INTRODUCTION

This analysis addresses the potential air quality impacts resulting from criteria air pollutant emissions created by the construction and operation of the Three Mountain Power Project (TMPP). Criteria air pollutants are those for which a state or federal standard has been established. They include nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), ozone (O₃) and its precursors (NO_x and VOC), volatile organic compounds (VOC), particulate matter less than 10 microns in diameter (PM₁₀) and its precursors: NO_x, VOC, SO_x, and lead (Pb).

In carrying out this analysis, the California Energy Commission staff evaluated the following major points:

- whether the TMPP is likely to conform with applicable Federal, State and Shasta County Air Quality Management District (District) air quality laws, ordinances, regulations and standards, as required by Title 20, California Code of Regulations, section 1742.5 (b);
- whether the TMPP is likely to cause significant air quality impacts, including new violations of ambient air quality standards or contributions to existing violations of those standards, as required by Title 20, California Code of Regulations, section 1742 (b); and
- whether the mitigation proposed for the TMPP is adequate to lessen the potential impacts to a level of insignificance, as required by Title 20, California Code of Regulations, section 1744 (b).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

A new, major facility, located in an area that is not in attainment with the National Ambient Air Quality Standards (NAAQS) (non-attainment area), is subject to the federal New Source Review (NSR) program. The proposed project is located in an area that is designated as attainment for Ozone, CO and PM₁₀, and is unclassified for the federal NO₂ and SO₂ standards; therefore, it is not subject to the federal NSR requirements for these pollutants. However, the TMPP will be subject to federal Prevention of Significant Deterioration (PSD) review. In general, under the PSD program, the project must comply with Best Available Control Technology (BACT) for PM₁₀, NO₂, SO₂ and CO and demonstrate that its emission impacts will not significantly degrade the existing ambient air quality in the region. The Environmental Protection Agency (EPA) has delegated the authority to administer the PSD program to the District.

The TMPP's gas turbines are also subject to the federal New Source Performance Standards (NSPS). These standards include a NO_x emissions concentration of no

more than 75 parts per million (ppm) at 15 percent excess oxygen (ppm@15%O₂), and a SO_x emissions concentration of no more than 150 ppm@15%O₂.

STATE

California State Health and Safety Code, Section 41700, requires that: “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerate number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.”

LOCAL

As part of the Commission’s licensing process, in lieu of issuing a construction permit to the applicant for the TMPP, the District will prepare and present to the Commission a Determination of Compliance (DOC). The DOC will evaluate whether and under what conditions the proposed project will comply with the District’s applicable rules and regulations, as described below. The Commission staff will coordinate its air quality analysis with the District staff as they prepare the DOC, will review and comment on the Preliminary DOC to identify any issues of concern, and will incorporate the Final DOC’s recommended conditions of certification in its Final Staff Assessment.

The project is subject to the specific District rules and regulations that are briefly described below:

Rule 2.1: New Source Review (NSR): This local rule requires that the project be equipped with Best Available Control Technology (BACT) for each individual piece of equipment if its emissions exceed 25 pounds a day of reactive organic compounds (VOC) or nitrogen oxides (NO_x), or exceed 80 pounds a day of particulate matter less than 10 microns in diameter (PM₁₀) or sulfur oxides (SO_x), or exceed 500 pounds a day of carbon monoxide (CO). In addition, the rule prohibits the approval of a project if the project, including offsets, causes a new violation or makes worse an existing violation of the ambient air quality standards.

Rule 2.2: Emission Reduction Credits and Banking: Provides administrative procedures for quantification, registration and use of emission reduction credits generated from permanent reductions of permitted emissions sources. The requirements include the specific timing of an application for the credits and criteria for approval, such as the emission reduction credits must be real, enforceable, permanent, quantifiable and surplus.

Section (D)(4) states that under no circumstance shall any emission reductions occurring before July 26, 1994, other than those emission reductions described in Section (D)(5), be eligible for emission reduction credit certificates.

Section (D)(5) defines that emission reductions occurring after December 31, 1987 and before July 26, 1994, can be eligible for emission reduction credits if such

reductions are actual and have been formally recognized by the District in writing or were included in the District's emission inventory.

Section J specifies that the method used to calculate the emission reduction credits must be consistent with the method described in the District's NSR rule, which means that the credits shall be equal to the difference between the historical actual emissions and the proposed emissions.

Rule 2.28: Prevention of Significant Deterioration: This rule incorporates all elements and requirements of the Federal Prevention of Significant Deterioration program, including BACT and a modeling demonstration that the project will not significantly degrade the existing ambient air quality in the region.

Rule 3.28: Internal Combustion Engines: This rule establishes a NOx emission limit of 150 ppm and a CO emission limit of 4500 ppm for gas turbines.

Shasta County General Plan Policy AQ-2(e): This Shasta County General Air Quality policy specifies that any new project with emissions of non-attainment pollutants or their precursors exceeding 25 tons per year shall provide appropriate emission offsets.

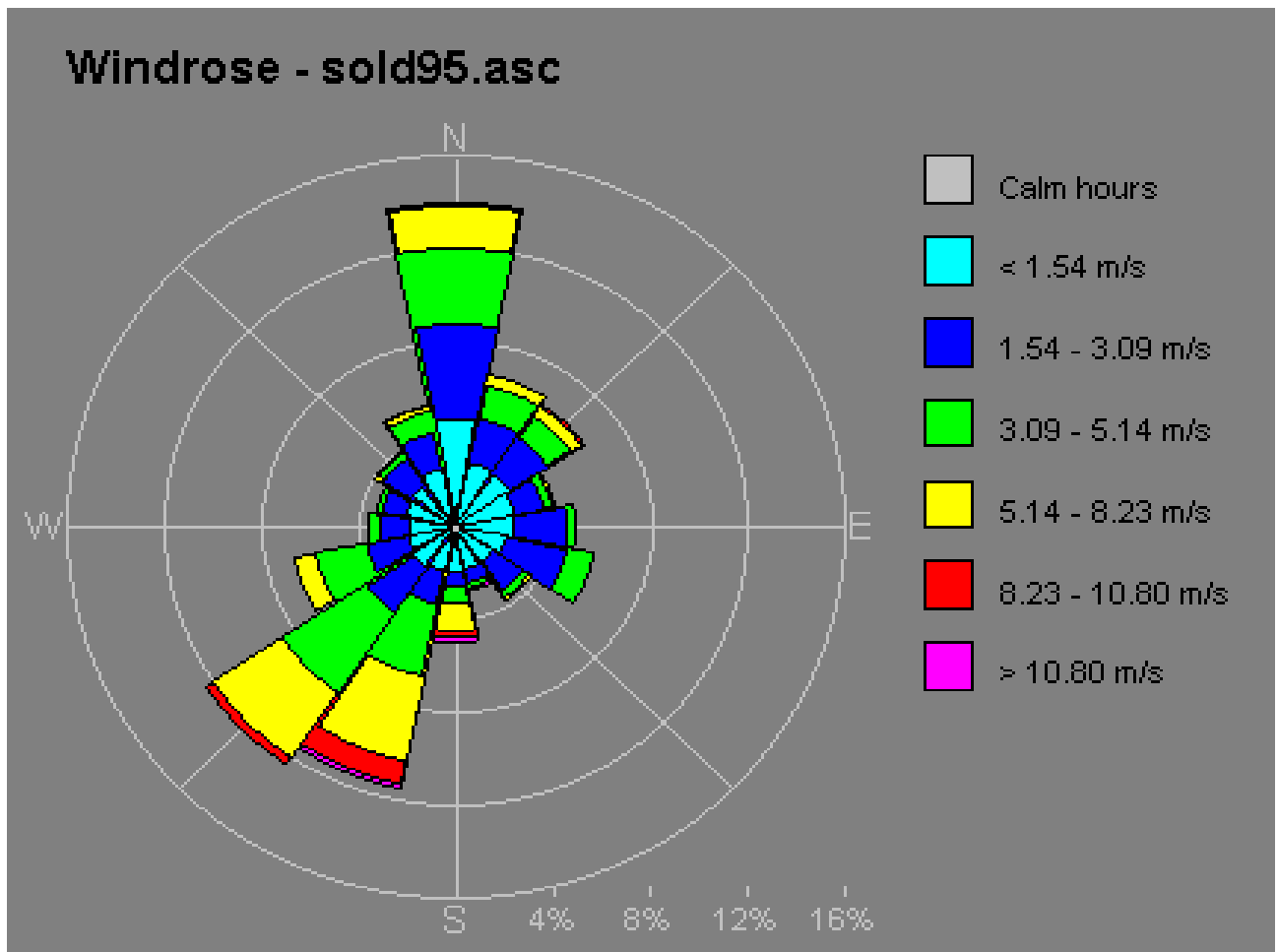
ENVIRONMENTAL SETTING

METEOROLOGICAL CONDITIONS

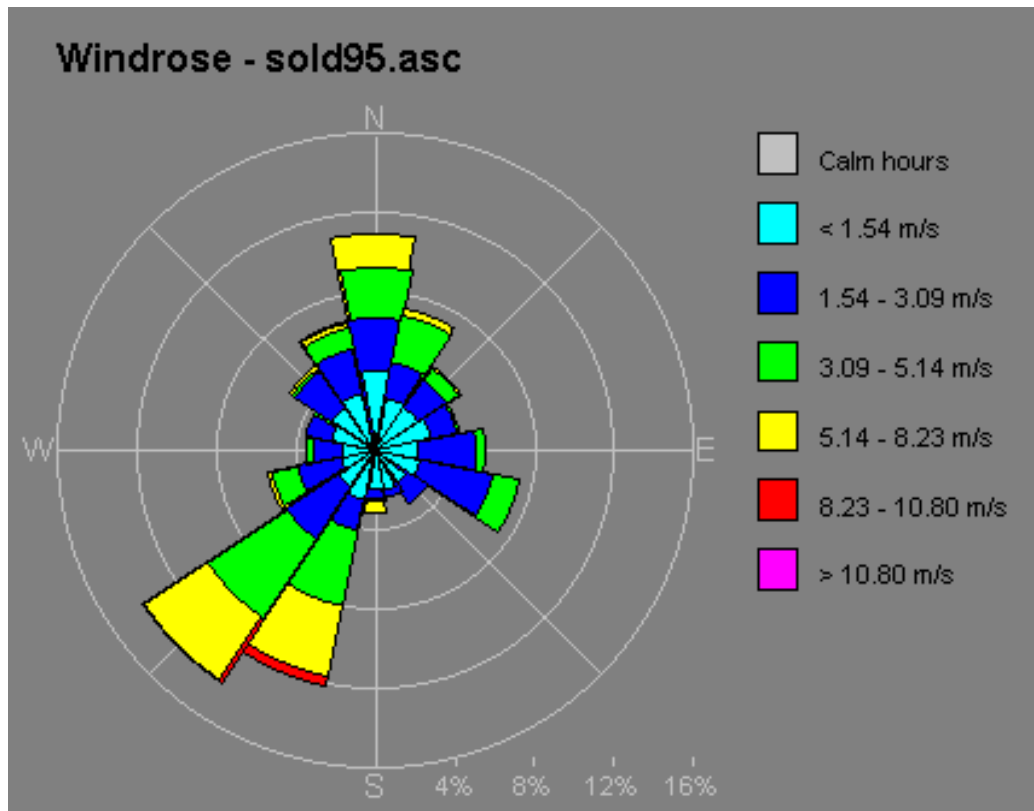
The project is located approximately two miles north of the town of Burney, at an elevation of 3,140 feet above sea level. At this level, the site is above the level of the inversion layer that affects the air quality in the northern Sacramento Valley (TMPP, 1999). During the winter months, the site may experience some inversions that trap the pollutants generated within the Burney Valley. The area is characterized by mild winters and cool summers, with an average of 28 inches of precipitation per year.

The most recent (1995) surface meteorological data, which are representative of the area, were collected at the Soldier Mountain monitoring station. The station is actually located at mid summit of Brush Mountain, approximately 4 miles northeast of Burney. The measured wind data are graphically presented as quarterly and annual wind roses in **AIR QUALITY Figures 1 to 5**. These wind roses show that the prevailing winds at the site during the summer months are from the south to southwest, and during the winter months are from the north. The wind roses indicate that the area experiences a large percentage of calms in winter, 32 percent, compared to 18 percent of calms in spring, 11 percent of calms in summer, and 18 percent of calms in fall.

AIR QUALITY Figure 1
Burney Annual Wind Rose

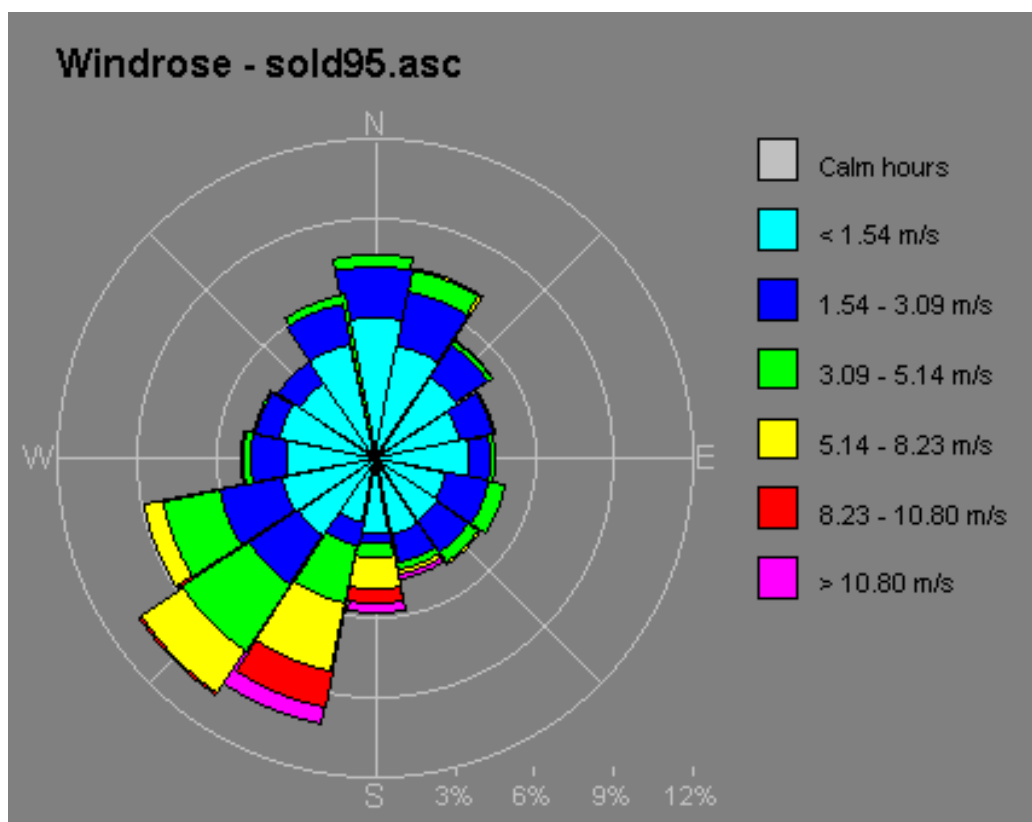


AIR QUALITY Figure 2
Burney September through November Wind Rose



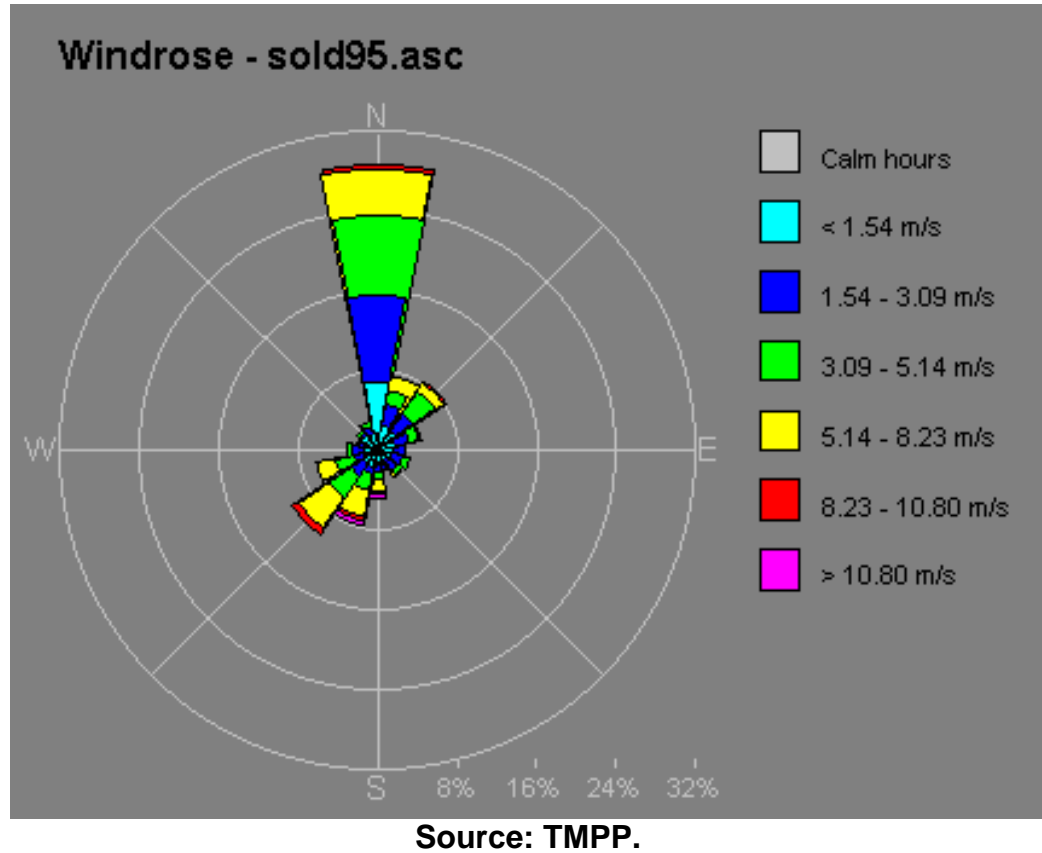
Source: TMPP.

AIR QUALITY Figure 3
Burney December through February Wind Rose

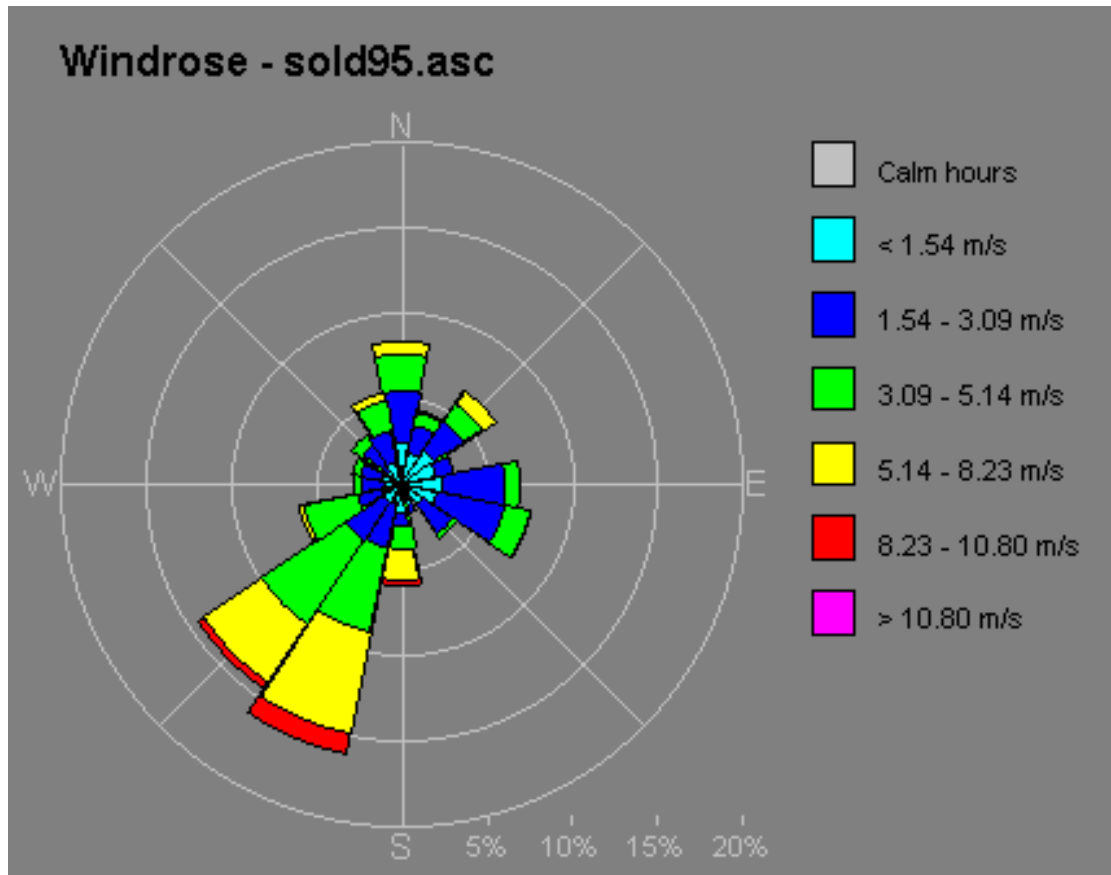


Source: TMPP.

AIR QUALITY Figure 4
Burney March through May Wind Rose



AIR QUALITY Figure 5
Burney June through August Wind Rose



Source: TMPP.

EXISTING AMBIENT AIR QUALITY

The federal and state ambient air quality standards (AAQS) represent the allowable maximum ambient concentrations of air pollutants, and are established by both the U.S. Environmental Protection Agency (EPA) and the California State Air Resources Board (CARB). The state AAQS, established by CARB, are typically lower (more stringent) than those established by EPA. The state and federal air quality standards are listed in **AIR QUALITY Table 1**. The averaging times for the various air quality standards (the times over which they are measured) range from one hour to one year. The standards are expressed either as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 and $\mu\text{g}/\text{m}^3$).

In general, an area is designated as attainment if the concentrations of a particular air contaminant do not exceed an ambient air quality standard. Likewise, an area is designated as non-attainment for an air contaminant if that standard is violated. Where not enough ambient data are available to support designation as either attainment or non-attainment, the area can be designated as unclassified. Unclassified areas are normally treated the same as attainment areas for regulatory purposes. An area can be attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same contaminant. The entire area within the boundaries of a district is usually evaluated to determine the district's attainment status.

The District is located in the Sacramento Valley Air Basin and has the same boundaries as Shasta County. It is currently classified as attainment for the federal ozone, CO and PM10 standards, and unclassified for the federal NO₂ and SO₂ standards. The District is currently designated as attainment for the state NO₂ and SO₂ standards, unclassified for the state CO standard, and non-attainment for the state ozone and PM10 standards.

EXISTING CO, NO₂ AND SO₂ AMBIENT AIR QUALITY FOR THE AREA

Ambient air quality data for ozone, PM10 and CO were collected at the project site between the period of 1989 through 1993. The monitoring station operated for a five year period. The data are presented in **AIR QUALITY Table 2**. After 1993, the station was dismantled and no ambient data have been collected at the site since then.

For CO, the ambient concentrations recorded were around $2300 \mu\text{g}/\text{m}^3$, which is well below either the state or the federal CO air quality standards.

AIR QUALITY Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone(O ₃)	1-hour	0.09 ppm (180 µg/m ³)	0.12 ppm (235 µg/m ³)	same as primary
	8-hour	---	0.08 ppm (157 µg/m ³)	
Particulate Matter (PM ₁₀)	Ann.Geo. Mean	30 µg/m ³	---	same as primary
	24-hour	50 µg/m ³	150 µg/m ³	
	Ann.Arit. Mean	---	50 µg/m ³	
Fine Particulate Matter (PM _{2.5})	24-hour	No state standard	65 µg/m ³	same as primary
	Ann.Arit.Mean		15 µg/m ³	
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m ³)	35 ppm (40 mg/m ³)	None
	8-hour	9 ppm (10 mg/m ³)	9 ppm (10 mg/m ³)	
Nitrogen Dioxide (NO ₂)	1-hour	0.25 ppm (470 µg/m ³)	---	same as primary
	Ann.AritMean	---	0.053 ppm (100 µg/m ³)	
Lead(Pb)	30-day	1.5 µg/m ³	---	same as primary
	Cal. Quarter	---	1.5 µg/m ³	
Sulfur Dioxide (SO ₂)	Ann.Arit. Mean	---	0.03 ppm (80 µg/m ³)	---
	24-hour	0.04 ppm (105 µg/m ³)	0.147 ppm (365 µg/m ³)	---
	3-hour	---	---	0.5 ppm (1300 µg/m ³)
	1-hour	0.25 ppm (655 µg/m ³)	---	---
Sulfates	24-hour	25 µg/m ³	No federal standard	
H ₂ S	1-hour	0.03 ppm (42 µg/m ³)	No federal standard	

Source: California Air Resources Board

Staff has not been able to obtain any recent ambient NO₂ or SO₂ data for the area. The only available ambient data available are three years of 1-hour NO₂ data (from 1990 to 1992) collected at the Redding monitoring station, which is located in the most populous area of the county where mobile and industrial sources contribute significantly to NO₂ levels. The data indicate that the highest recorded 1-hour NO₂ concentrations were between 132 and 94 µg/m³, which were well below the state standard of 470 µg/m³. As mentioned earlier, because of the lack of major industrial sources and no significant increase of population in the Burney area, staff believes that the NO₂ concentration in Burney, if available, would be well below those measured at the Redding monitoring station. Therefore, the use of Redding ambient NO₂ data should be overly conservative.

As for SO₂, the whole county is classified as attainment for the state and unclassified for the federal SO₂ standards. Even though the local ambient SO₂ concentration data are not available, staff believes that the area is comparable with the SO₂ data for the Sacramento Valley air basin. The highest measured 24-hour SO₂ concentration, measured at the Sacramento Del Paso Manor monitoring station, that is representative of the entire basin, is 0.018 ppm. This is well below the state and federal 24-hour SO₂ ambient standards of 0.04 and 0.147 ppm, respectively.

The existing ambient air quality data for CO, NO₂ and SO₂ are tabulated in **AIR QUALITY Table 2**.

EXISTING OZONE AMBIENT AIR QUALITY FOR THE AREA

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted air pollutants. Nitrogen oxides (NO_x) and hydrocarbons (Volatile Organic Compounds [VOC]) interact in the presence of sunlight to form ozone.

Although the ambient air quality data in **AIR QUALITY Table 2** are sketchy and not up to date, staff believes that the data are suitable to describe the conditions of the area where the facility is going to be sited. Staff has reviewed the Burney area's inventory of stationary sources emissions from 1990 to 1996 (the latest data available), and finds that the Burney area lacks of sufficient industrial sources to produce significant NO₂ and VOC (ozone precursors) emissions. The emission inventory data from 1990 to 1996 were tabulated in **AIR QUALITY Table 3**. Based on these data, the area has not experienced any growth in stationary sources' emissions since 1990. Based on this review, staff believes that the available data presented in **Air Quality Table 2** can represent the current environment of the Burney area.

The ambient ozone concentrations recorded between 1989 and 1992 have ranged from 7 to 9 parts per hundred millions (pphm). The area did not experience any violations of either the state or federal ozone air quality standards.

AIR QUALITY Table 2
Maximum Ambient Air Quality Measurements Recorded at the Burney Monitoring Station (1989 through 1993)

Pollutant	Averaging time	1993	1992	1991	1990	1989	Most Restrictive Ambient Air Quality Standard
Ozone (pphm)	1-hr	NA	9	7	8	8	9 (CAAQS)
No. of violations		NA	0	0	0	0	
PM ₁₀ (µg/m ³)	24-hr	91	86	80	80	91	50 (CAAQS)
	Annual	35	29	29	29	29	30 (CAAQS)
Calculated no. of days of violation		18	36	60	54	54	
NO ₂ ¹ (µg/m ³)	1-hr	NA	94	132	132	NA	470 (CAAQS)
CO(µg/m ³)	8-hr	NA	1150	2300	2620	2875	10000 (CAAQS & NAAQS)
SO ₂ (µg/m ³)	1-hr	NA	NA	NA	NA	NA	655 (CAAQS)
Notes: CAAQS = California Ambient Air Quality Standard NAAQS = National Ambient Air Quality Standard ¹ Data for the 1-hour NO ₂ are from the Redding monitoring station. NA = data are not available							

Source: CARB: California Air Quality Data.

AIR QUALITY Table 3
1990 through 1996 Burney Area Industrial Stationary Source Emission Inventory

POLLUTANTS	1990 ¹	1993	1995	1996
VOC	74	37	40	57
CO	1975	1680	1280	1580
NO ₂	297	416	582	270
PM ₁₀	200	48	56	67

Source: ARB emission inventory.

¹ 1990 emission inventory is not completed.

EXISTING PM₁₀ AMBIENT AIR QUALITY FOR THE AREA

PM₁₀ can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NO_x, SO_x and VOC from turbines, given the right meteorological conditions, form particulate matter known as nitrates (NO₃), sulfates (SO₄), and organics. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions in the atmosphere.

Unlike ozone, the Burney area experiences numerous violations of the state PM₁₀ ambient air quality standards. During the period of measurements (1989 through 1993), the data shows that PM₁₀ violations occurred between the months of November through March when the weather is cold. The Burney area experiences

a low inversion layer during these cold months. This low inversion layer traps the pollutants causing a build up of pollutants, which contributes to the violations of the PM10 air quality standard.

WHAT CAUSES **PM10** VIOLATIONS IN THE **BURNEY** AREA?

A review of the industrial emission inventory data in **AIR QUALITY Table 3** reveals that there are only five industrial stationary sources in Burney. They are Burney Forest Products, Burney Mountain Power, PG&E, Dicalite, and Sierra Pacific. These five sources PM10 emissions have been reduced from 200 TPY in 1990 to 67 TPY in 1996. Some area residents believe that the operation of the Burney Mountain Power facility and the expansion of the Dicalite mining facility may worsen the PM10 air quality in the Burney area in future years. Based on the emission inventory data, the Burney Mountain Power facility's PM10 emissions were steadily reduced from the 140 TPY level in 1990 to 16.5 TPY in 1996. The Dicalite facility is a mining operation where fugitive dust may be a problem, but staff does not believe that the mining operation causes any significant dust problem in the winter because the soil is wet, and thus dust would not be entrained into the air.

Based on the above review, staff believes that the PM10 problem in this area is caused primarily by residential wood heating devices, which is a typical problem for mountain community areas. According to the District staff, in 1990, the District had attempted to develop a measure to control the emissions from wood stoves and fireplaces in Shasta County. However, due to lack of public support, the control measure was not adopted.

In conclusion, staff believes that the area has not experienced any significant change in population, has shown a reduction of emissions from industrial stationary sources, thus the ambient PM10 data collected from 1989 to 1993 are representative of the area's existing conditions. In addition, at the November 4, 1999 workshop, the applicant has agreed to collect five year ambient data to enhance the understanding of the area's environmental conditions. The first two years of data collection will be prior to and during the construction of the project, with the remaining three years of data collection to occur after the project commences operation.

Based on the available ambient PM10 data, the area has experienced some improvement in ambient PM10 conditions from 1989 to 1993. The PM10 concentrations recorded were as high as 91 µg/m³ during this period. There were 50 to 60 days of PM10 violations per year from 1989 through 1991. Those numbers were reduced to 18 to 36 days per year in 1992 and 1993. [The number of days of violations are calculated based upon the number of violations measured. PM10 levels are ordinarily recorded once every six days.] Based on these data, the area has not showed any significant improvement in terms of PM10 concentrations, but does show a reduction of the frequency of PM10 violations.

PROJECT EMISSIONS

CONSTRUCTION ACTIVITIES

The construction of the proposed project will last approximately 20 months, and generally consists of two major activities; site preparation, and construction and installation of major equipment and structures. The applicant provided estimated peak hourly, daily and annual construction equipment exhaust emissions (TMPP 1999, Table 6.8-8). The maximum daily construction emissions are identified in **AIR QUALITY Table 4**. Staff reviewed the applicant's estimated construction emissions, and believes that they are reasonable.

Emissions from construction equipment exhausts, such as vehicles and internal combustion engines, are also expected during the project construction phase. A small amount of hydrocarbon emissions may also occur as a result of the temporary storage of petroleum fuel at the site.

Site preparation, which would last for approximately nine (9) months, involves clearing and grading of the 10.2 acres site, and completion of the facility's foundations. Construction equipment used at this phase includes a motor grader, four tractors, one excavator hydraulic crawler, one vibrator compactor, three cranes, and various heavy duty construction equipment and trucks, including concrete and water spray trucks. The applicant provided maximum fugitive dust PM10 emissions from site preparation (TMPP 1999, Tables 6.8-9). They are presented in **AIR QUALITY Table 4** for each activity, including excavation, compacting, grading, back-filling, fugitive emissions, and construction vehicles traveling on unpaved areas.

AIR QUALITY Table 4
Maximum Daily Construction Emissions (lbs/day)

Construction Emission Sources	NOx	SO2	VOC	CO	PM10
Facility Construction					
Heavy Equipment	368	34	46	335	22
Worker Vehicles	1	Neg.	1	9	Neg.
Fugitive Dust					215
Water Pipeline	8	1	Neg.	4	Neg.
Fugitive Dust					153
Natural Gas Pipeline	16	1	2	9	Neg.
Fugitive Dust					253
Transmission Line Tie-in	21	2	2	36	1
Fugitive Dust					92
Total	410	40	50	390	740

Sources: AFC Tables 6.8-7 through 6.8-9.

In addition to construction of the main facility, there will be a new water line (approximately 5,280 feet) and a new natural gas pipeline (approximately 8,986 feet long). The applicant provided maximum emissions for these construction activities (TMPP, 1999), which are also included in **AIR QUALITY Table 4**.

For the water and natural gas pipelines, construction activities will consist of excavation/trenching, pipe laying, back filling and compaction. Equipment used in the construction of the water and natural gas pipelines include two backhoes, two trenchers, two compactors, one welding machine and various trucks for supplies and water. It is assumed that the construction activities of these two linear facilities will be continuous for 8 hrs/day, five days per week for the entire construction period of these two facilities. The applicant provided maximum daily construction emissions for all construction activities (TMPP, 1999), which are included in **Air Quality Table 4**.

PROJECT OPERATION

The project will be built with the following major components:

- Two natural gas fired combustion turbines (either GE Frame 7 or Westinghouse 501F),
- Two heat recovery steam generators (HRSG),
- Two steam turbines,
- One 31.5 MMBTU/hr natural gas fired auxiliary boiler,
- One cooling tower, and
- One emergency diesel fuel water pump to be used in case of fire.

The turbines will be operating in combined cycle mode to produce approximately 500 MW of electricity. The facility is expected to be at least 95 percent available and can operate up to 8,322 hours per year. Each HRSG will be equipped with a duct burner to increase steam production. The applicant proposes to equip each combustion turbine with a dry low NO_x combustion technology and a selective catalytic reduction (SCR) system in the HRSG, which together limits the NO_x emissions to 2.5 ppm@15% O₂. To control the CO and VOC emissions, the applicant proposes to equip each combustion turbine/HRSG with a high-temperature oxidation catalyst system, which limits the CO emissions to 4 ppm and the VOC emissions to 1 ppm (TMPP 1999, page 6.8-23).

The applicant is requesting that the project be analyzed with the assumption of one cold-start, 50 warm-starts, 255 hot-starts and 306 shutdowns per turbine each year. A hot start would occur after an overnight turbine shutdown. The duration of a hot start is relatively short, approximately half an hour. A warm start-up duration would occur after a typical weekend shutdown (approximately 60 to 72 hours). A warm start-up is also approximately 30 minutes in duration, although the steam turbine ramping up period would be longer than a hot start. A cold start takes considerably longer, as much as three hours. However, this type of start-up would be very rare,

occurring only after the turbines have been under extended shutdown, such as the annual maintenance inspection that the manufacturer may require.

The facility's hourly, daily and annual emissions were estimated with information on the Westinghouse 501F and GE7F turbines provided by the applicant, and are presented in **AIR QUALITY Tables 5, 6 and 7**.

- The cooling tower is comprised of eight cells, each of which will be equipped with drift eliminators that limit the drift rate to 0.0005 percent. The cooling tower is designed to circulate approximately 125,000 gallons of water per minute (gpm). The cooling tower emissions are estimated using this circulation rate, a drift rate of 0.0005 percent and a 108 ppm total dissolved solid content of the cooling tower make up water.

During startup and shutdown, combustion temperatures and pressures are rapidly changing, which results in less efficient combustion and higher emissions. The applicant proposes the use of the auxiliary boiler to evenly warm-up the steam generators, thus reducing the time of start-up and the turbines' excess emissions. The auxiliary boiler will be equipped with a flue gas re-circulation system and low NOx burner. The boiler is proposed to operate for no more than 740 hours per year.

The daily emissions from the project are shown in **AIR QUALITY Table 6**. The table shows different operating scenarios, and the resultant emissions, including CTG startup (cold, warm and hot), shutdown, and steady state operation. Staff has not included the emissions of the emergency diesel fueled fire pump because it is used only in case of emergency during which time the turbines are not operating. In addition, the emergency turbine would add approximately one pound of NOx emissions each week during its 30 minute testing. This amount of emissions is relatively insignificant to change the impact of the project. The project's typical daily emissions are presented in the last row of the table.

AIR QUALITY Table 5
Project Hourly Emissions
(pounds per hour [lb/hr] except where noted)

Operational Profile	NOx	SO2	PM10	VOC	CO
GE7FA Cold Start-up w. Aux. Boiler (4 hours)	430	8	240	160	1500
GE7FA Warm Start-up w. Aux. Boiler (120 min.)	275	4	140	60	900
GE7FA Hot Start-up w. Aux. Boiler (90 min.)	150	3	100	60	850
GE7FA Shutdown (30 min.)	75	1	30	50	350
GE7FA Steady State @ 100% load	34.6	2	20	9.6	50.6
W501F Cold Start-up w. Aux. Boiler (3 hours)	280	8	240	278	2210
W501F Warm Start-up w. Aux. Boiler (120 min.)	246	4	140	277	2230
W501F Hot Start-up w. Aux. Boiler (60 min.)	223	3	100	229	1700
W501F Shutdown (30 min.)	75	1	30	51	350
W501F Steady State @ 100% load	31.2	2	32.7	8.7	45.5
Cooling Towers	--	--	0.34	--	--
Total Facility Emissions at Steady State (lbs/hr)	34.6	4	33	9.6	50.6

AIR QUALITY Table 6
Project Daily Emissions
(pounds per day [lb/day])

Operational Profile	NOx	SO2	PM10	VOC	CO
2 turbine sequential cold-start and steady state operation (GE7A)	1,120	48	640	350	2,510
2 turbine sequential cold-start and steady state operation (W501F)	940	48	930	460	3,170
2 turbine 24-hr steady state full load operation (GE7A)	830	48	480	230	1,210
2 turbine 24-hr steady state full load operation (W501F)	750	480	780	210	1,100
Cooling towers operating 24-hr	--	--	8	--	--
Maximum steady state daily operation: 2 turbines and cooling towers	830	48	780	230	1,210

AIR QUALITY Table 7
Project Annual Emissions
(tons per year [TPY])

Operational Profile	NOx	SO2	PM10 ¹	VOC	CO
1 cold start, 50 warm starts, 255 hot starts, 4,912 hr steady state ² (GE7FA)	123	9	120	40.7	210
Steady State for 8,322 hrs per year (GE7FA)	144	9	167	40.1	310
1 cold start, 50 warm starts, 255 hot starts, 4,912 hr steady state ³ (W501F)	123	9	101	65.4	438
Steady State for 8,322 hrs per year (W501F)	130	9	136	36.2	189
Notes: ¹ Including cooling tower emissions. ² Assume 4 hr for each cold start, 2 hr for each warm start, 1.5 hr for each hot start, 4,912 hr steady state, and 8322 hours cooling towers operation. ³ Assume 3 hr for each cold start, 2 hr for each warm start, 1 hr for each hot start, 4,912 hr steady state, and 8322 hours cooling towers operation.					

INITIAL COMMISSIONING

Prior to beginning commercial operation, the combustion turbines will undergo initial test firing. During this commissioning phase, the project may operate at a low-load for a long period of time for fine tuning, which may cause some excess emissions. Even at this level, staff does not believe that the project will exceed the permitted emission levels due to the allocated number of start-up and shut down cycles the applicant has requested for this project.

CLOSURE

Eventually the TMPP will close, either as a result of the end of its useful life, or through some unexpected situation, such as a natural disaster or catastrophic facility breakdown. When the facility closes, then all sources of air emissions will cease and thus all impacts associated with those emissions will no longer occur.

The only other expected emissions will be fugitive particulate emissions from the dismantling activities. These activities will be short term and will create fugitive dust emissions levels much lower than those created during the construction of the project. Nevertheless, staff recommends that a facility closure plan to be submitted to the Energy Commission Compliance Project Manager to demonstrate compliance with applicable District Rules and Regulations during closure activities.

AMMONIA EMISSIONS

Due to the large combustion turbines used in this project and the need to control NO_x emissions, significant amounts of ammonia will be injected into the flue gas stream as part of the SCR system. Not all of this ammonia will mix in the flue gases to reduce NO_x; a portion of the ammonia will pass through the SCR and is emitted unaltered, out the stacks. These ammonia emissions are known as ammonia slip. The applicant has committed to an ammonia slip no greater than 10 ppm, which is the current lowest ammonia slip level being permitted throughout California. However, the ARB, in its recent "Guidance for Power Plant Siting and Best Available Control Technology" document, recommends that air districts consider establishing ammonia slip level of below 5 ppm (ARB 1999).

On a daily basis, a 10 ppm slip is equivalent to approximately 2,400 pounds of ammonia emitted into the atmosphere. However, based on the ammonia slip levels of existing power plants in California, staff believes that the expected ammonia emissions from the project would be in the range of 200 to 700 lbs/day. When actual ammonia slip approaches 10 ppm, it is an indication that the catalyst of the SCR system needs to be replaced. Also, staff does not believe that the typical ammonia slip (200 to 700 pounds) will contribute significantly to additional secondary PM₁₀ formation in the area due to the absence of the nitric acid and free hydroxide radicals typically found in more industrialized areas.

IMPACTS

Air dispersion models provide a means of predicting the location and magnitude of the air contaminant impacts of a new emissions source at ground level. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions. The model results are often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). They are an estimate of the concentration of the pollutant emitted by the project that will occur at ground level.

The applicant has used an EPA-approved ISCST3 model to estimate the impacts of the project's NO_x, PM₁₀, CO and SO_x emissions resulting from project construction and operation. A description of the modeling analyses and results are provided in Appendix E of the AFC (TMPP, 1999). Staff added the applicant's modeled impacts to the available highest ambient background concentrations measured during 1989 through 1993 at the Burney monitoring station. Staff then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or contribute to an existing violation.

Inputs for the modeling include stack information (exhaust flow rate, temperature, stack dimensions), specific turbine emission data and meteorological data, such as wind speed, atmospheric conditions, and the site elevation. For this project, the meteorological data used as input for the modeling included the hourly wind speeds and directions measured at the Soldier Mountain monitoring station. It should be noted that the monitoring station name is Soldier Mountain, but it is not physically located at Soldier Mountain. The true physical location of the monitoring station is at mid-summit of Brush Mountain, which is located about four miles west of the project site and at an elevation of approximately 3,500 feet (the project is located at an elevation of 3,173 feet).

CONSTRUCTION IMPACTS

The results of the project construction impacts are presented in **AIR QUALITY Table 8**. The modeling analyses included both the fugitive dust and vehicle exhaust emissions, which include PM10, NOx and CO. In **AIR QUALITY Table 8**, the first column represents the air contaminant, i.e., NO2, PM10, and CO. The second column presents the averaging time for each air contaminant analyzed. The third column presents the project emission impacts. The fourth column presents the highest measured concentration of the criteria air contaminants in the ambient air (background). The fifth column presents the total impact, i.e., the sum of project emission impact and background measured concentration. As indicated in **Air Quality Table 8**, the project construction activities would cause a violation of the state 1-hour NO2 standards and further exacerbate existing violations of the state 24-hour PM10 standard. In reviewing the modeling output files, the project's construction impacts are not expected to be occasional or isolated events, but will occur over an area at the project's property fence lines where the general public does not have access.

The predicted impacts are high for a number of reasons. First, the model itself calculates impacts that are very conservative, usually exceeding actual impact levels by a considerable margin. Second, the analysis assumes that all the NOx emitted from the vehicles is in the form of NO2. In reality, approximately 90 percent of NOx emissions from a combustion source are in the form of nitrogen oxide (NO), which eventually would oxidize to NO2 as they disperse in the atmosphere. Therefore, the one-hour NO2 impact shown in the modeling analysis does not realistically reflect the possible one-hour NO2 impact.

Third, some of the sources of combustion emissions (the bulldozers and trucks) are mobile sources, not stationary sources. Therefore, as mobile sources, the air quality impacts would not always be at the same locations, so the modeling results are overstated. Fourth, it was assumed that all the equipment identified for the modeling evaluation would be running simultaneously. It is doubtful that all the major equipment, 4 large bulldozers, 4 backhoes, 12 cranes and 5 large flatbed trucks, would all be operating at one time, and thus the impacts are overstated.

Finally, the emissions inputs to the model were from the highest monthly emissions assumed during the 20-month construction period. The levels of emissions used

reflect a period of activity of approximately one year, not the entire construction period. During the other months of construction work, considerably less emission generating equipment will be used and thus the impacts will be even lower.

AIR QUALITY Table 8
Facility Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Total Impacts ($\mu\text{g}/\text{m}^3$)	Standards ($\mu\text{g}/\text{m}^3$)	Percent of Standard
NO2	1-hr.	1,530	130	1,660	470	350%
CO	8-hr.	1,870	2870	4,740	10,000	47%
PM10	24-hr.	201	91	292	50	584%

Although construction of the TMPP will result in unavoidable short-term impacts, it is doubtful that the general public would be exposed to the construction impacts associated with the project. This is because the highest impacts are registered at the property fence line and drop off to about 26 mg/m³ at the nearest residential area of Johnson Park. Actually, the highest estimated impacts outside of the property fence line do not cause a new violation or contribute to an existing violation of either NO₂ or PM₁₀ air quality standards. Nevertheless, staff believes that the impacts from the construction of the project can be further reduced with the implementation of the staff recommended construction mitigation measures, as discussed in the Mitigation section.

OPERATION IMPACTS

The applicant provided staff with a modeling analysis of the project's operating emissions impacts from directly emitted pollutants, which they believe demonstrates that no violations of ambient air quality standards will be caused by the operation of the project. Staff reviewed the applicant's modeling analysis, including the meteorological data collected at Brush Mountain, and concludes that it is adequate.

AIR QUALITY Table 9 presents the results of the modeling analysis using worst case hourly emissions, which include turbine start-up and cooling tower emissions as presented in **AIR QUALITY Table 5**. **AIR QUALITY Table 9** shows that, with the exception of PM₁₀, the project does not cause any new violations of any applicable air quality standard. As for PM₁₀, staff does not believe that the project itself causes a violation of either the 24-hour or the annual PM₁₀ air quality standard. However, the project's impacts will contribute to the PM₁₀ violations in the area that regularly occur during the cold months of the year when wood stoves and fireplaces are commonly being used. Therefore, staff recommends that the project PM₁₀ emissions be offset by emission reductions from the local area. It should also be noted that the typical project emission impacts representing the project normal operation, not including start ups, will be less than the values shown in **AIR QUALITY Table 9** because the project emissions during normal operation will be lower than the emissions used in the modeling analyses.

AIR QUALITY Table 9
Worst Case Facility Emission Impacts on Ambient Air Quality

Pollutants	Avg. Period	Impacts($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Total Impacts ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)	Percent of Standard
NO ₂	1-hour	224	134 ¹	358	470	76%
	Annual	1	22	23	100	23%
SO ₂	1-hour	2	n/a	n/a	655	n/a
	24-hour	1	n/a	n/a	n/a	n/a
CO	1-hour	1,000	4,570	5,570	23,000	24%
	8-hour	465	2,860	3,325	10,000	33%
PM ₁₀	24-hour	6	91	97	50	194%
	Annual	1	35	36	30	120%

Note: ¹ The background concentration of NO₂ is from the Redding Monitoring station.

CUMULATIVE IMPACTS

Staff's cumulative impacts assessment is composed of two types of analysis. The first is an analysis of the project's directly emitted pollutants along with similar emissions from other foreseeable future projects that are currently under construction, or are currently under District review. The second is a discussion of the project's potential contribution to the formation of secondary pollutants, namely ozone and PM₁₀.

DIRECTLY EMITTED POLLUTANT IMPACTS

To evaluate the direct emission impacts of the TMPP along with other probable future projects, staff needs specific information that is included when project applicants file an application with the District for a permit. Projects located up to six miles from the proposed facility usually need to be included in the analysis. Staff assumes that impacts from projects beyond six miles would not effect the modeling analysis on a cumulative basis. Staff reviewed the District permit files and found that there are no sources currently being built or proposed to be built within the six mile radius of the project site. Therefore, a directly emitted pollutant cumulative impact analysis was not performed.

SECONDARY POLLUTANT IMPACTS

The project's gaseous emissions, primarily NO_x, SO₂, VOC and ammonia, can contribute to the formation of ozone and PM₁₀. There are air dispersion models that can be used to quantify ozone impacts, but they are only appropriate for use in regional air quality planning efforts where numerous sources are input into the modeling to determine the regional ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NO_x and VOC emissions to ozone formation, staff believes that the emissions of NO_x and VOC from the TMPP do have the potential to significantly contribute to ozone levels in the region if not mitigated.

Concerning ammonium nitrate, as described earlier, staff does not believe that the project will have any significant potential to contribute to the ammonium nitrate emissions to the area due to the lack of free hydroxide radicals and nitric acid in the area ambient air.

Concerning sulfates as PM10, staff believes that the project will contribute to sulfates levels in the area, although in a very small amount. Currently, there are no agency (EPA or CARB) recommended models or procedures for estimating sulfate formation. Nevertheless, studies during the past two decades have provided data on the oxidation rates of SO₂. The data from these studies can be used to approximate the conversion of SO₂ to particulate (typically about 0.01 to 1 percent per hour) with Gaussian dispersion models such as ISCST3. The model can be performed with and without chemical conversion (decay factor) and the difference corresponds to the amount of SO₂ that is converted to PM10. Because the project uses natural gas as fuel, very little SO₂ emissions will be emitted; thus the SO₂ to sulfates conversion modeling is not performed or needed. Staff still recommends that offsets, in the form of emission reductions in the local area, should be provided to lessen the project's PM10 contribution to the ambient air to the level of insignificance.

VISIBILITY IMPACTS

The applicant has provided as part of their PSD application to the District, a visibility impact analysis, which shows that the project is not expected to exceed any significant visibility impairment increment inside any nearby PSD Class I areas (TMPP, 1999). Class I areas are areas of special national or regional value from a natural, scenic, recreational, or historic perspective. There are three Class I areas within 100 km of the project site. They are Lassen Volcanic National Park (40 km), Thousand Lakes Wilderness (20 km) and Caribou Wilderness (45km) areas.

MITIGATION

APPLICANT'S PROPOSED MITIGATION

CONSTRUCTION PHASE

The applicant has provided a list of mitigation measures to be employed during construction. These measures are intended to lessen the short-term impacts on the ambient air, especially for NO₂ and PM10, and are listed below:

- Frequent watering of unpaved roads and disturbed areas (at least twice a day).
- Limit speed of vehicles on the construction areas to no more than 10 MPH.
- Use tire washing and gravel ramps prior to entering a public roadway to limit accumulated mud and dirt deposited on the roads.

- Treat the entrance roadways to the construction site with soil stabilization compounds.
- Place sandbags adjacent to roadways to prevent run-off to public roadways.
- Install windbreaks at the windward sides of construction areas prior to the soil being disturbed. The windbreaks shall remain in place until the soil is stabilized or permanently covered.
- Use of dust sweeping vehicles at least twice a day to sweep the public roadways that are used by construction and worker vehicles.
- Sweep newly paved roads at least twice weekly.
- Limit on equipment idle times (no more than fifteen minutes).
- Use of electric motors for construction equipment when feasible.
- Apply covers or dust suppressants to soil storage piles and disturbed areas that remain inactive over two weeks.
- Pre-wet the soil to be excavated during construction.
- Use of soot filters on all large off-road construction equipment with an engine rating of at least 100 bhp.

Because the construction emissions are short-term, no emission reduction credits are proposed to be used to offset the new emissions.

OPERATION PHASE

The applicant proposes to mitigate the emission increases from the proposed facility using a combination of clean fuel, emission control devices and emission reduction credits. The applicant proposes to use a combination of dry low-NO_x combustion design, Selective Catalytic Reduction (SCR) and high-temperature CO oxidation catalyst technology for each of the combined cycle turbine trains to minimize its NO_x and CO emissions. The proposed control devices are designed to maintain the turbine/duct burner emissions to 2.5 ppm NO_x, 4 ppm CO, and 1 ppm VOC. The ammonia slip emissions (from unreacted ammonia in the SCR) will be maintained at 10 ppm or less. Natural gas will be the only fuel used, which should minimize the project's PM₁₀ and SO_x emissions. In addition, the applicant will equip the cooling towers with high efficiency drift eliminators that limit the drift rate to 0.0005 percent. The drift eliminators will minimize the cooling towers' PM₁₀ emissions. Below is a brief description of the emission control technologies the TMPP will employ.

DRY LOW-NO_x COMBUSTORS

Over the last 20 years, combustion turbine manufacturers have focused their attention on limiting the NO_x formed during combustion. Because of the expense and efficiency losses due to the use of steam or water injection in the combustor cans to reduce combustion temperatures and the formation of NO_x, CTG manufacturers are presently choosing to limit NO_x formation through the use of dry

low-NO_x technologies. In this process, firing temperatures remain somewhat low, thus minimizing NO_x formation, while thermal efficiencies remain high.

FLUE GAS CONTROLS

To further reduce the emissions from the combustion turbines before they are exhausted into the atmosphere, flue gas controls, primarily catalyst systems, will be installed in the HRSG. The applicant is proposing two catalyst systems, a selective catalytic reduction system (SCR) to reduce NO_x, and an oxidizing system to reduce CO and VOC.

SELECTIVE CATALYTIC REDUCTION (SCR)

Selective catalytic reduction refers to a process that chemically reduces NO_x by injecting ammonia into the flue gas stream over a catalyst in the presence of oxygen. The process is termed selective because the ammonia reducing agent preferentially reacts with NO_x rather than oxygen, producing inert nitrogen and water vapor. The performance and effectiveness of SCR systems are related to operating temperatures, which may vary with catalyst designs. Flue gas temperatures from a combustion turbine typically range from 950 to 1100°F.

Catalysts generally operate between 600 to 750°F (ARB 1992), and are normally placed inside the HRSG where the flue gas temperature has cooled. At temperatures lower than 600°F, the ammonia reaction rate may start to decline, resulting in increasing ammonia emissions, called ammonia slip. At temperatures above about 800°F, depending on the type of material used in the catalyst, damage to some catalysts can occur. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or a noble metal are also used. These newer catalysts (versus the older alumina-based catalysts) are resistant to fuel sulfur fouling at temperatures below 770°F (EPRI 1990).

Regardless of the type of catalyst used, efficient conversion of NO_x to nitrogen and water vapor requires uniform mixing of ammonia into the exhaust gas stream. Also, the catalyst surface has to be large enough to ensure sufficient time for the reaction to take place.

The applicant proposes to use a combination of dry low-NO_x combustor and an SCR system to produce a maximum NO_x concentration exiting the HRSG stack of 2.5 ppm, corrected to 15 percent excess oxygen averaged over a 1-hour period.

OXIDIZING CATALYST

To reduce the turbine CO and VOC emissions, the applicant proposes to install an oxidizing catalyst, which is similar in concept to catalytic converters used in automobiles. The catalyst is usually coated with a noble metal, such as platinum, which will oxidize unburned hydrocarbons and CO to water vapor and carbon dioxide (CO₂). The CO catalyst is proposed to limit the CO concentrations to 4 ppm at 15 percent O₂.

COOLING TOWER

Cooling tower drift consists of small water droplets, which contain particulate matter that originates from the total dissolved solids in the circulating water. To limit the particulate emissions, drift eliminators are installed in the cooling tower to capture the water droplets. The applicant intends to use drift eliminators on the cooling tower with a design efficiency of 0.0005 percent. This is a very high level of efficiency for cooling tower drift eliminators. Similar cooling tower designs have been used successfully by a number of other projects licensed by the Energy Commission in recent years.

OFFSETS

The Shasta County Air Quality Management District's New Source Review Rule 2.1 does not require the applicant to provide any emission offsets for the project. However, under the Shasta County General Plan Air Quality Policy 2.e, any new project that has emissions exceeding 25 tons per year (TPY) of any non-attainment air contaminants or their precursors shall provide emission offsets. Since the entire district is classified as non-attainment for the state 1-hour ozone and the 24-hour PM10 standards, and the project will exceed the 25 TPY threshold for NO₂, VOC and PM10, the applicant has agreed to provide offsets for the project (TMPP, 1999).

The applicant has entered into an option agreement to purchase 153 TPY of NO_x and 30 TPY of VOC emission reduction credits from Sierra Pacific. Sierra Pacific has been granted a banking certificate from the District for the 1984 shut down of equipment at the Anderson saw mill facility, which is located approximately 40 miles south west of Burney. According to the applicant, the emission reduction credits are sufficient in quantity to fully mitigate the project's NO₂ and VOC emissions.

The applicant proposes to pave 0.65 mile of Black Ranch Road between State Route 299 and State Route 89, near the town of Burney, to offset the TMPP's PM10 emission increases. According to the applicant, the paving of this road will generate approximately 162 TPY of PM10 emission reduction credits, which would be sufficient to offset the PM10 emissions on a pound per pound basis.

ADEQUACY OF PROPOSED MITIGATION MEASURES

CONSTRUCTION PHASE MITIGATION

- As mentioned earlier in the impact section, the construction of the project will cause PM10 emissions, which will add to the existing violations of the ambient PM10 air quality standard. Staff believes the implementation of the construction mitigation measures will be effective in reducing the short-term impacts of the project to a level of insignificance.

OPERATION PHASE MITIGATION

Staff believes that the proposed dry low-NO_x and SCR system control, the CO oxidation catalyst system, and the use of high efficient drift eliminator represent a

feasible mitigation, and are consistent with the District, the ARB and EPA recommendations for BACT.

OFFSETS

Staff is currently evaluating the adequacy of the proposed offsets in consultation with the District, EPA and ARB staff and will provide its analysis in the Final Staff Assessment.

As mentioned in the Setting section, the Burney area is unique in that its air quality, during the winter months, is not significantly affected by transport from the Sacramento Valley air basin, which includes Redding. Nevertheless, the Burney area is experiencing regular exceedances of the state 24-hour PM10 standard, especially during the cold winter months. Therefore, staff believes that emissions offsets must be provided from the local area to effectively mitigate the facility's PM10 emissions impacts.

At the November 3, 1999 workshop, local residents expressed concerns that the county traffic survey of Black Ranch Road was not correct. Staff also indicated that they will need data on the actual silt content of the road dirt in order to verify the actual amount of emission reductions that will be generated from paving the road. The applicant has agreed to review the traffic survey, and has solicited inputs from the area residents regarding the paving of other roads in the area. The applicant also agreed to conduct testing of the road dirt to determine its silt content.

The applicant's proposed PM10 emission reductions from road paving are effective only during the dry months of the year when fugitive dust is created by vehicles traveling on the local unpaved roads. During the winter months no PM10 emission reductions from road paving would be realized because the soil is wet or the road is covered with snow. Thus the emission reductions from road paving are not effective in reducing the impacts from the facility during the winter months.

STAFF PROPOSED MITIGATION

To mitigate the project's PM10 emissions contribution, staff recommends that the applicant implement a combination of road paving and retrofitting of residential wood burning devices used in the Burney area as mitigation measures.

For road paving, the applicant should identify a section of a road with better records of traffic use, and conduct actual road dirt silt content measurements. The length of road that is needed to be paved will be determined by:

- the amount of emission reduction credits needed to offsets the project PM10 emissions for the dry months of April through October (approximately 97 tons),
- the traffic survey, and
- the road dirt silt content.

In addition to road paving, staff suggests the applicant subsidize the replacement of existing residential wood stoves and fireplaces with EPA phase II certified wood stoves and fireplace inserts for willing residents of the town of Burney. This would mitigate the project's direct PM10 contribution to the wintertime PM10 problem, which is caused, in large part, by residential wood burning.

Staff recommends that the applicant conduct a survey of residents in the Burney area or pursue other approaches to quantify the number of households with wood stoves and fireplaces, and the amount of wood burned per household. This information will be used to establish the feasibility of replacing residential wood burning devices with certified wood stoves and certified fireplace inserts to achieve emission reduction credits for the project.

Based on a preliminary review of available information, such as the quantity of wood burned per year per household (ARB, 1989), and the population of Burney, staff estimates that up to 100 TPY of PM10 emission reduction credits may be developed from replacement of wood stoves and fireplace inserts in the Burney area. A quick screening of local wood stove suppliers indicates that it would cost between \$900.00 to \$1,500.00 to replace an existing wood stove or modified a fireplace with a certified unit.

In addition to reducing the PM10 emissions, the certified wood stoves and fireplace inserts also improve the efficiency of the wood burning process, which results in a reduction in the amount of wood being burned. This will also reduce emissions of NO₂, SO₂, and VOC, all of which are precursors to PM10 formation.

COMPLIANCE WITH LORS

FEDERAL

The applicant has submitted to the District an application for the federal PSD permit. The District will issue a Preliminary Determination of Compliance (PDOC) in middle of December 1999. The PDOC will also serve as the preliminary PSD permit. Staff is currently working with the District, ARB and EPA in discussing issues to be addressed in the District's preparation of the PDOC.

In addition, the applicant is required to obtain from the District a Federal Operating Permit (Title V) within one month after the project starts to operate. The applicant is also required to submit an acid rain application (Title IV) to the District at least 24 months prior to the project generating electricity. Compliance with both of these federal titles will be determined at a later date.

STATE

Staff will address the project's compliance with Section 41700 of the California State Health and Safety Code in the FSA.

LOCAL

Because of the delay of issuance of the District's PDOC, staff will address the project's compliance with local rules and regulations in the FSA.

CONCLUSIONS AND RECOMMENDATIONS

Staff cannot make specific recommendations on the project, including conditions of certification, until the District has issued its Determination of Compliance.

REFERENCES

ARB (Air Resource Board). 1987-1998. California Air Quality Data, Annual and Quarterly Summaries.

ARB (Air Resource Board). 1989. A Proposed Suggested Control Measure for the Control of Emissions from Residential Wood Combustion.

TMPP (Three Mountain Power, LLC) 1999. Application for Certification, Three Mountain Power Project (99-AFC-2). Submitted to the California Energy Commission, March 14, 1999.

WORKER SAFETY AND FIRE PROTECTION

Chris Tooker

INTRODUCTION

Industrial workers use process equipment and hazardous materials on a daily basis. Accidents involving relatively small amounts of material can result in serious injuries to workers. Worker protection measures can include special training, protective equipment and procedural controls. The employer must also comply with applicable laws, ordinances, regulations and standards (LORS) to protect workers. This Worker Safety and Fire Protection analysis assesses the completeness and adequacy of the measures proposed for the Three Mountain Power Project (TMPP) by the applicant, Three Mountain Power, LLC, to comply with applicable health and safety standards and other reasonable requirements (Title 20, California Code Regulations, section 1743); and draws conclusions about the compliance of the proposed project with applicable LORS (Title 20, California Code Regulations, section 1744). These standards are designed to protect the health and safety of workers during construction and operation of the facility, and to establish adequate fire protection and emergency response procedures.

Staff has reviewed the TMPP Application for Certification (AFC) to determine whether the applicant has proposed adequate measures to:

- comply with all applicable LORS;
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

Unless features of the project present unusual industrial safety or fire protection problems, staff believes that compliance with applicable LORS will be sufficient to ensure worker safety and fire protection, and provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

Occupational Safety and Health Act of 1970 (29 United States Code sections 651 et seq.).

Occupational Safety and Health Administration Safety and Health regulations (29 Code of Federal Regulations §§ 1910.1 - 1910.1500)

Occupational Safety and Health Act of 1970 (29 United States Code section (USC) (§) 651 et seq.).

29 C.F.R. §1910.120 (HAZWOPER Standard) Defines the regulations for Hazardous Waste Operations and Emergency Response. This section covers the clean-up operations, hazardous materials removal work, corrective actions, voluntary clean-up operations, monitoring, and emergency response required by federal, state, and local agencies of hazardous substances that are present at controlled and uncontrolled hazardous waste sites.

29 C.F.R. §§1910.1 - 1910.1500 (Occupational Safety and Health Administration Safety and Health regulations)

29 C.F.R. §§1952.170 - 1952.175 (Approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in §§ 1910.1 - 1910.1500)

STATE

California's plan for enforcement of its own Safety and Health requirements is in lieu of most of the federal requirements found in 29 CFR §§ 1952.170 - 1952.175.

- Title 8, California Code of Regulations (CCR), section 450 et seq. (Applicable requirements of the Division of Industrial Safety, including Unfired Pressure Vessel Safety Orders, Construction Safety Orders, Electrical Safety Orders, and General Industry Safety Orders).
- California Building Code, Title 24, CCR, § 501 et seq. The California Building Code is designed to provide minimum standards to safeguard human life, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, etc. of buildings and structures.
- Title 8, CCR, § 5192 (HAZWOPER Standard). Defines the regulations for Hazardous Waste Operations and Emergency Response. This section covers the clean-up operations, hazardous removal work, corrective actions, voluntary clean-up operations, monitoring, and emergency response required by federal, state, local agencies of hazardous substances that are present at controlled and uncontrolled hazardous waste sites.

LOCAL

1998 Edition of California Fire Code (CFC) and all applicable National Fire Protection Association (NFPA) standards. The fire code contains provisions necessary for fire prevention and information about fire safety, special occupancy uses, special processes, and explosive, flammable, combustible and hazardous materials.

Uniform Fire Code Standards. This is a companion publication to the CFC and contains standards of the American Society for Testing and Materials and of the National Fire Protection Association.

California Building Code. (Cal. Code Regs., Tit. 24, § 501 et seq.) The California Building Code is designed to provide minimum standards to safeguard human life,

health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, etc. of buildings and structures.

SETTING

The TMPP is proposed to be located about one mile northeast of the town of Burney in Shasta County, approximately 45 miles northeast of Redding. For a complete description of the 10 acre site and the proposed combined cycle power plant, refer to the **Project Description** section of this PSA and the AFC, Vol. 1 (TMPP, 1999a). The two fire departments that will provide services for the proposed project are the Burney Fire Protection District (District), and the Shasta County Fire Department, which is administered by the California Division of Forestry (CDF). The District will be the first responder to structural fires associated with the power plant and related electric transmission and gas pipelines. Its closest station in Burney has a 5 to 10 minute response time to the proposed facility location. The District has three full-time firefighters and from 20 to 25 volunteer firefighters; five fire fighting engines, with pumping capacities ranging from 400 to 1,250 gallons per minute, and can call for support from surrounding fire departments (TMPP, 1999b). The District's extension ladders are, however, limited to thirty-five feet, which are inadequate for reaching the upper levels of the proposed facilities (Sullivan 1999).

During the fire season from May through October the CDF's staff and equipment is located in Johnson Park, just east of Burney, and is responsible for responding to wildland fires that could occur in the areas adjacent to the project facilities, including the power plant site and the electric transmission line. At other times of the year, CDF will be located in Redding. The next closest fire department available to respond is the Cassel Volunteer Fire Department, located 12 miles from Burney.

IMPACTS

DIRECT IMPACTS

FIRE PROTECTION

To determine the project's impacts on fire protection, staff reviewed the information provided in the AFC regarding available fire protection services and equipment, which are intended to limit personnel injury and property loss (TMPP 1999a, Section 6.11.1.3.5, pp 6-14 to 6-16). The project will include the following fire protection components: a fire water system, including storage, piping and pumps, fire hydrants and sprinkler systems, a carbon dioxide fire protection system, fire detection sensors, and portable fire extinguishers. The applicant will be required to provide final diagrams and plans to staff and the District, prior to construction and operation of the project, to confirm the adequacy of these fire protection measures.

The TMPP will also be supported by local fire protection services, as described above. The District has evaluated the potential impacts of the proposed project on

their service capabilities. In a letter to the Commission staff, dated 11/22/99, the District has identified the need for the applicant to purchase additional equipment and provide training to District staff (Sullivan, 1999):

- One ladder truck with one hundred foot platform
- Training for personnel on ladder truck
- Training for personnel on hazardous materials handling
- Three Macaw backpacks

The one hundred foot platform (ladder) truck would be used to reach the upper levels of the project facilities at the plant site. The backpacks would be used during small fires in the grass or in the hazardous materials storage areas.

WORKER SAFETY

As is true of most industrial work environments, workers associated with both the construction and operation of the TMPP may be exposed to numerous hazards, including chemical spills, hazardous wastes, fires, moving equipment, and electrical shocks, as described in Table 6.11-1 (p 6.11-2) of the AFC. It is important for the applicant to have well-defined policies, procedures, training, hazard recognition and control at their facility to minimize such hazards and to protect workers. The applicant has provided adequate outlines of their proposed worker safety plans that will be expanded prior to construction and operation of the project, as required by conditions of certification **SAFETY-1** and **SAFETY-2** (TMPP 1999a, Sections 6.11.1.2.1 through 6.11.1.3.4).

CUMULATIVE IMPACTS

There are no other large industrial facilities proposed to be built in the area that would contribute to impacts on the District's service capabilities. However, according to the District, two existing resource recovery facilities in the area which burn saw mill waste to generate electricity require service capabilities for tall structure fires similar to those identified for the TMPP (Sullivan, 1999). Those facilities are Sierra Pacific and Burney Mountain Power.

MITIGATION

As mitigation for the impacts to fire protection services, as described above, the District and the applicant are engaged in ongoing discussions regarding the funding of the equipment and training needs identified by the District. The District also intends to request support from the existing Sierra Pacific and Burney Mountain Power facilities to fund the equipment and training needs identified in their letter of November 22, 1999 (Sullivan, 1999). A condition of certification to assure that the applicant provides their share of funding of the District's identified needs is being proposed in the **Socioeconomics** section of this PSA.

CONSTRUCTION SAFETY AND HEALTH PROGRAM

The Construction Safety Orders found in Title 8, California Code of Regulations contain health and safety requirements promulgated by California Occupational

Safety and Health Administration (Cal/OSHA) that are applicable to the construction phase of the project (CCR, tit. 8, § 1500 et seq.). The various plans required by the regulations are incorporated in the project Construction Safety and Health Program, the major elements of which include:

- Construction Injury and Illness Prevention Program (IIPP) (CCR, tit. 8, § 1509);
- Construction Fire Protection and Prevention Plan (CCR, tit. 8, § 1920);
- Personal Protective Equipment Program (CCR, tit. 8, §§ 1514 - 1522; and §§ 3401 - 3411).

In addition, the requirements of the Electrical Safety Orders (CCR, tit. 8, and §§ 2299 - 2974) and Unfired Pressure Vessel Safety Orders (CCR, tit. 8, §§ 450 - 544) may be applicable to the project.

The applicant provided adequate outlines in the AFC for each of the above programs and plans (TMPP 1999, Sections 6.11.1.2 through 6.11.1.2.4). Prior to construction of the facility the applicant will provide detailed programs and plans in accordance with condition of certification **SAFETY-1**.

OPERATION SAFETY AND HEALTH PROGRAM

During the operation phase of the project, many Electrical Safety Orders (CCR, tit. 8, and §§-2299 - 2974) and Unfired Pressure Vessel Safety Orders (CCR, tit. 8, §§ 450 - 544) will be applicable. In addition, the Division of Industrial Safety has promulgated regulations applicable solely to operations. These are contained in the General Industry Safety Orders (CCR, tit. 8, § 3200 et seq.). The applicant will incorporate these requirements into its Operation Safety and Health Program, the major elements of which include:

- Injury and Illness Prevention Program (CCR, tit. 8, § 3203)
- Emergency Action Plan (CCR, tit. 8, § 3220)
- Fire Prevention Plan (CCR, tit. 8, § 3221)
- Personal Protective Equipment Program (CCR, tit. 8, §§ 3401 - 3411)

The applicant provided adequate outlines for each of the programs and plans in the AFC (TMPP 1999, Sections 6.11.1.3 through 6.11.1.3.4) and will provide detailed programs and plans in accordance with condition of certification **SAFETY-2**.

SAFETY AND HEALTH PROGRAM ELEMENTS

The applicant has provided proposed outlines for both a Construction Safety and Health Program and an Operation Safety and Health Program (TMPP 1999a, Sections 6.11.1.2 and 6.11.1.3). Both programs will cover the TMPP, including any aspect of the transmission lines and pipelines under the applicant's control. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

INJURY AND ILLNESS PREVENTION PROGRAM

The applicant has provided an adequate draft outline for an Injury and Illness Prevention Program (IIPP). The applicant will need to submit an expanded Injury and Illness Prevention Program to Cal/OSHA for review and comment 30 days prior to both construction and operation of the project.

Cal/OSHA will review and provide comments on the IIPP as the result of an on-site consultation at the request of the applicant. During the consultation a Cal/OSHA representative will complete a physical survey of the site, analyze the work practices, and point out those practices that are likely to result in illness or injury. The on-site consultation will give Cal/OSHA an opportunity to evaluate the TMPP IIPP and apply it directly to activities taking place on-site.

EMERGENCY ACTION PLAN

Title 8, California Code of Regulations, section 3220 requires an Emergency Action Plan. The AFC contains a satisfactory outline for an emergency action plan, including fire and emergency reporting procedures, evacuation procedures, and a Spill Prevention/Control and Countermeasure Plan. Staff proposes condition of certification **SAFETY-2**, which requires the applicant to submit a final Operation's Emergency Action Plan to Cal/OSHA, for review and comment, after an on-site consultation.

FIRE PROTECTION PLAN

Title 8, California Code of Regulations, section 3221 requires a Fire Protection Plan. The AFC contains an outline of a fire protection and prevention plan that is adequate for staff's analysis. The outline includes the appropriate components, including, training, fire control and emergency response, alarm systems, fire fighting equipment, and materials storage and disposal procedures.

Staff proposes that the applicant submit a Construction Fire Protection and Prevention Plan and an Operation Fire Protection Plan to the California Energy Commission Compliance Project Manager (CPM) and the District for review and acceptance to satisfy proposed conditions of certification **SAFETY-1 and 2**.

PERSONAL PROTECTIVE EQUIPMENT PROGRAM

The purpose of the Personal Protective Equipment Program is to ensure that employers comply with applicable requirements for the provision and use of Personal Protective Equipment (PPE), and to provide employees with the information and training necessary to carry out the program. The applicant has provided a satisfactory outline that identifies minimum requirements of a proposed PPE program.

Under Title 8, California Code Regulations, sections 3380 - 3400, personal protective equipment will be required whenever hazards are encountered which, due to process, environment, chemicals, or mechanical irritants, can cause injury or impairment of body function as a result of absorption, inhalation, or physical contact.

The project's operational environment will create potential situations where personal protective equipment is required.

The TMPP PPE Program should include a written policy on: the use of protective equipment (and methods of communicating the information to the employees), selection of the proper type of equipment, training of employees on the correct use and maintenance of the equipment, enforcement of personal protective equipment use, and the use of devices that provide respiratory protection, hearing conservation, eye protection and head protection.

Staff believes that if the applicant develops and carries out a PPE program similar to the format and elements listed above, the program will meet applicable regulations and will significantly reduce the potential for adverse impacts to workers.

GENERAL SAFETY

Besides the specific plans listed above, there are other requirements, some of which are called "safe work practices," imposed by various worker safety LORS applicable to this project. For the sake of clarity, staff has grouped these requirements as follows:

LIGHTING

American National Standards Practice for Industrial Lighting, ANSI/IES-RP-7, contains requirements to protect workers from inadequate lighting. Insufficient light leads to errors and sometimes accidents. An error may result from not seeing a situation that is dangerous and not being able to react quickly enough. The **Visual Resources** section of this PSA provides further detail concerning off-site consequences and performance requirements for exterior lighting.

HAZARDOUS MATERIALS RELEASES

Staff's analysis considered the system design and administrative procedures proposed to reduce the likelihood of an accidental release of acutely hazardous materials that could affect workers. See the **Hazardous Materials** section of this PSA for more detail.

SMOKING

The applicant shall not allow smoking in areas designated in the National Electrical Code (NEC) as Class I, Divisions 1 and 2. These locations are areas where ignitable concentrations of flammable gases or vapors exist or where volatile flammable liquids or flammable gases are handled, processed, or used. Signs restricting smoking in these areas of the project site will be posted to protect the facility and workers.

LOCK-OUT/TAG-OUT

Title 8, California Code of Regulations, sections 2320.4, 2320.5, 2320.6, 2530.43, 2530.86, 3314, and 6003 identify required lock-out and tag-out safety practices and programs which reduce employee exposure to moving equipment, electrical shock, and hazardous and toxic materials. Lock-out is the placement of a padlock, blank

flange, or similar device on equipment to ensure that it will not be operated until the lock-out device is removed. Tag-out is the use of warning signs that caution personnel that equipment cannot be energized until the lock-out device is removed. Warning signs can also be used to alert employees about the presence of hazardous and toxic materials. The applicant's lock-out/tag-out program should include steps for applying locks and tags, steps for removing locks and tags, and employee training on lock-out/tag-out procedures.

CONFINED SPACES ENTRY PROGRAM

Title 8, California Code of Regulations, Sections 5156 - 5159 identifies the minimal standards for preventing employee exposure to dangerous air contaminants and/or oxygen deficiency in confined spaces. A confined space is any space that limits the means of egress, is subject to toxic or flammable contaminants, or has an oxygen-deficient atmosphere. Examples of confined spaces are silos, tanks, vats, vessels, boilers, compartments, ducts, sewers, pipelines, vaults, bins and pits. TMPP shall take the following steps to ensure worker safety during work in confined spaces.

Before entering a confined space, site personnel will evacuate or purge the space and will shut off lines that provide access for substances into the space. The air in the vessels will be tested for oxygen deficiency, and the presence of both toxic and explosive gases and vapors will be evaluated before entry into the confined space is allowed. Lifelines or safety harnesses will be worn by anyone entering the confined space, and a person will be stationed outside in a position to handle the line and to summon assistance in case of emergency. Appropriate respirators will be available whenever hazardous conditions may occur.

HOT WORK

Hot work is any type of work that causes a spark and can ignite a fuel source. Examples include welding, cutting and brazing. Before proceeding with hot work, workers will need to get a work authorization from the project's assigned Safety Officer. The control operator, together with the shift supervisor, will decide whether hot work is required on a job and if a work authorization will be required. Before hot work is undertaken, the area will be inspected, the job shall be posted and, depending on what is located in the area, additional safeguards may be implemented.

FACILITY CLOSURE

The project owner/operator is responsible for maintaining an operational fire protection system during closure activities. The project must also stay in compliance with all applicable health and safety LORS during that time.

CONCLUSION AND RECOMMENDATIONS

CONCLUSIONS

If the applicant provides a Construction Safety and Health Plan, and an Operation Safety and Health Plan, as required by conditions of certification **SAFETY-1** and **2**; and provides the funding required by Conditions of Certification **SOCIO-2**, staff believes that the project will incorporate sufficient measures to ensure adequate levels of industrial safety and fire protection, and comply with applicable LORS.

RECOMMENDATIONS

If the Energy Commission certifies the project, staff recommends that the Energy Commission adopt the following proposed conditions of certification. The proposed conditions of certification provide assurance that the Project Construction and Operation Safety and Health Programs proposed by the applicant will be reviewed by the appropriate agencies before implementation. The conditions also require verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable LORS.

PROPOSED CONDITIONS OF CERTIFICATION

SAFETY-1 The project owner shall submit to the CPM a Project Construction Safety and Health Program, which shall include:

- A Construction Injury and Illness Prevention Program.
- A Construction Fire Protection and Prevention Plan.
- A Personal Protective Equipment Program.

Protocol: The Construction Injury and Illness Prevention Program and the Personal Protective Equipment Program shall be submitted to the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) Consultation Service, for review and comment concerning compliance of the program with all applicable Safety Orders.

The Construction Fire Protection and Prevention Plan shall be submitted to the Burney Fire Protection District for review and acceptance.

Verification: Thirty days prior to the start of construction, or a lesser period of time as mutually agreed to by the project owner and the CPM, the project owner shall submit to the CPM a copy of the Project Construction Safety and Health Program and the Personal Protective Equipment Program, with a copy of the cover letter of transmittal of the plan to CAL-OSHA. The project owner shall provide a letter from the Burney Fire Protection District stating that they have reviewed and accept the Construction Fire Protection and Prevention Plan.

SAFETY-2 The project owner shall submit to the CPM a Project Operation Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan.
- An Emergency Action Plan.
- An Operation Fire Protection Plan.
- A Personal Protective Equipment Program.

Protocol: The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to the Cal/OSHA Consultation Service, for review and comment concerning compliance of the program with all applicable Safety Orders.

The Operation Fire Protection Plan and the Emergency Action Plan shall be submitted to the Burney Fire Protection District for review and acceptance.

Verification: At least 30 days prior to the start of operation, the project owner shall submit to the CPM a copy of the final version of the Project Operation Safety & Health Program. It shall incorporate Cal/OSHA's Consultation Service comments, stating that they have reviewed and accepted the specified elements of the proposed Operation Safety and Health Plan.

The project owner shall notify the CPM that the Project Operation Safety and Health Program (Injury and Illness Prevention Plan, Fire Protection Plan, the Emergency Action Plan, and Personal Protective Equipment requirements), including all records and files on accidents and incidents, is present on-site and available for inspection.

SAFETY-3 The project owner shall design and install all exterior lighting to meet the requirements contained in the Visual Resources conditions of certification and in accordance with the American National Standards Practice for Industrial Lighting, ANSI/IES-RP-7.

Verification: Within 60 days after construction is completed, the project owner shall submit a statement to the CPM that the illuminance levels contained in ANSI/IES RP-7 were used as a basis for the design and installation of the exterior lighting.

REFERENCES

Cal/OSHA Consultation. 1990. Cal/OSHA Consultation Pamphlet.

Sullivan, L. 1999. Fire Chief, Burney Fire Protection District. Meeting with James Adams, November 4, 1999; Letter to James Adams, California Energy Commission, November 22, 1999.

TMPP (Three Mountain Power Project/McFadden) 1999a. Submittal of the Application for Certification, Three Mountain Power Project, (99-AFC-2). Submitted to the California Energy Commission, March 3, 1999.

TMPP (Three Mountain Power Project/McFadden) 1999b. Submittal of responses to staff data requests 2 - 9 and 13 – 43. Submitted to the California Energy Commission, September 2, 1999.

SOIL & WATER RESOURCES

Richard Sapudar and Linda Bond

INTRODUCTION

This analysis examines the water and soil resource aspects of the Three Mountain Power Project (TMPP), specifically focusing on the following areas of concern:

- how the project's demand for water affects groundwater supplies;
- whether project construction or operation will lead to accelerated wind or water erosion and sedimentation;
- whether project construction or operation will lead to degradation of surface or groundwater quality; and
- whether the project will comply with all applicable laws, ordinances, regulations and standards.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

CLEAN WATER ACT

The Clean Water Act (33 USC section 1257 et seq.) requires states to set standards to protect water quality. Point source discharges to surface water are regulated by this act through requirements set forth in a National Pollutant Discharge Elimination System (NPDES) Permit. Stormwater discharges during construction and operation of a facility also fall under this act and must be addressed through either a project specific or general NPDES permit. In California, the nine Regional Water Quality Control Boards (RWQCB) administer the requirements of the Clean Water Act. Section 404 of the act regulates the discharge of dredged or fill material into waters of the United States, including rivers, streams and wetlands. The Army Corp of Engineers (ACOE) issues site-specific or general (nationwide) permits for such discharges.

STATE

PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Water Quality Control Act of 1967, Water Code section 13000 et seq., requires the State Water Resources Control Board and the nine regional RWQCBs to adopt water quality criteria to protect state waters. These criteria include the identification of beneficial uses, narrative and numerical water quality standards and implementation procedures. The criteria for the project area are contained in the Central Valley Region Water Quality Control Plan (Basin Plan 1994). This plan sets numerical and narrative water quality standards controlling the discharge of wastes with elevated temperature to the state's waters.

These standards are applied to the proposed project through the Waste Discharge Requirement (WDR) permit.

Section 13552.6 of the Water Code specifically identifies that the use of potable domestic water for cooling towers, if suitable recycled water is available, is an unreasonable use of water. The availability of recycled water is based upon a number of criteria, which must be taken into account by the SWRCB. These criteria are that: the quality and quantity of the reclaimed water are suitable for the use; the cost is reasonable, the use is not detrimental to public health, will not impact downstream users or biological resources, and will not degrade water quality. Section 13552.8 of the Water Code states that any public agency may require the use of recycled water in cooling towers if certain criteria are met. These criteria include that recycled water is available and meets the requirements set forth in section 13550; the use does not adversely affect any existing water right; and if there is public exposure to cooling tower mist using recycled water, appropriate mitigation or control is necessary.

The SWRCB has also adopted a number of policies that provide guidelines for water quality protection. The principle policy of the State Board which addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling (adopted by the Board on June 19, 1976 by Resolution 75-58). This policy states that use of fresh inland waters should only be used for powerplant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. This SWRCB policy requires that power plant cooling water should, in order of priority come from wastewater being discharged to the ocean, ocean water, brackish water from natural sources or irrigation return flow, inland waste waters of low total dissolved solids, and other inland waters. This policy goes on to address cooling water discharge prohibitions.

Sections 401 of the Clean Water Act provides for state certification of federal permits allowing discharge of dredged or fill material into waters of the United States. These certifications are issued by the RWQCBs. For this project, the 401 certification will be handled with the Waste Discharge Requirements (WDR) permit.

THE SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65)

The Safe Drinking Water and Toxic Enforcement Act of 1986, Health and Safety Code section 25249.5 et seq., prohibits the discharge or release of chemicals known to cause cancer or reproductive toxicity into drinking water sources.

LOCAL

SHASTA COUNTY GENERAL PLAN

The Shasta County General Plan (General Plan) Chapter 12.12 establishes minimum requirements and requires that a permit be obtained for grading, excavating and filling activities in order to:

1. Control erosion and sedimentation to prevent damage to off-site property and streams, watercourses, and aquatic habitat.
2. Avoid creation of unstable slopes or filled areas.
3. Prevent impairment or destruction of potential leach fields for sewage disposal systems.
4. Regulate de facto development caused by uncontrolled grading.
5. A “major project” grading permit will be required for this project.

SETTING

REGIONAL DESCRIPTION

The proposed Three Mountain Power Project (TMPP) is located in northeastern Shasta County, approximately one-mile northeast of the community of Burney. The proposed project site will occupy a 10.2 acre portion located in the southern corner of the 40 acre parcel occupied by the existing 10 MW biomass-fired Burney Mountain power plant, which is supplied with approximately 300 acre-feet of water per year by a well located on the site. The electrical substation will occupy an additional 200-foot by 500-foot parcel located to the northwest of the TMPP site and across the railroad right-of-way.

The climate of Shasta County is characteristic of the northern Sacramento Valley, with dry, hot summers and wet, cool winters. Rainfall occurs mainly between October and April. The average annual precipitation is approximately 27.7 inches with an annual snowfall of 38.4 inches. The average annual temperature in the basin is 40-degree Fahrenheit, and ranges between an average monthly low temperature of 30-degree Fahrenheit to an average monthly high temperature of 65-degree Fahrenheit. The daily temperatures average from over 100-degree Fahrenheit in the summer to below zero in the winter (TMPP 1999a, Appendix J).

Agricultural land uses represent about 15 percent of the development within Shasta County, while about 50 percent of the county is dedicated to commercial forest use. (TMPP 1999a). The project area is located in what is characterized by Shasta County as a “large mountain meadow,” specifically in Burney Creek Valley. Portions of these meadows are irrigated and are used for grazing and crops, with many of these lands under Williamson Act contracts.

There are no surface water bodies in the immediate vicinity of the project site. This is due to the high permeability of the volcanic rocks. This high permeability is not intrinsic to these rocks themselves, but to the water flowing through fractures along surfaces of lava flows, through fractures of fragmented volcanics, and possibly through lava tubes. Since faulting causes extensive fracturing in such rocks, faults may provide additional primary pathways for groundwater recharge (CH2M, 1988).

The main drainage in the Burney basin is Burney Creek, which discharges from the basin at Burney Falls, which is located approximately 8 miles northeast of the city of Burney off Highway 89. Burney Falls flows into Burney Creek, which then flows about 2 miles before reaching Lake Britton, which is on the Pit River. The other major surface water features in Shasta County consist of Shasta Lake, which is approximately 35 miles southwest of Burney, and Big Lake, which is located approximately 20 miles northeast of Burney.

The Burney basin is between the Modoc Plateau and Cascade geologic provinces. A string of volcanoes extending from Lassen Peak in the south, northward to the California-Oregon border and up into Washington state, is characteristic of the Cascade geologic province. Young volcanic flows, lake sediments, and alluvium filled fault-block valleys are characteristic of the Modoc Plateau. Older (Plio-Pleistocene) units occur in the western and southwestern parts of the basin, with younger (Pleistocene to recent) units occurring in the central, northern, and northwestern parts of the basin. There are also north-trending normal faults that bound tilted faults in the basin in which sediments are deposited (TMPP 1999a).

The Burney watershed is a topographic enclosure, blanketed with volcanic rocks, covered with a thin sheet of soil. The most recently deposited volcanic rocks are predominately highly fractured lava flows, which contain most of the fresh groundwater in the Burney valley. Fresh water is stored and transmitted in these fractures of the lava flows. These young, highly fractured lava flows are the primary aquifer for the Burney basin. (For the purposes of this document, Burney basin is defined as the lower elevations of the Burney watershed from which productive wells yield groundwater.) Overlying the primary aquifer are limited areas of recent, low-permeability lake deposits. One such area is along Burney Creek, north of the city of Burney. Beneath the primary aquifer are low permeability old lake deposits and older volcanic rocks.

The aquifer system of Burney basin is regionally unconfined, based on the geology of the region and the nature of a fractured-rock aquifer system. A confined aquifer requires an extensive layer of low-permeability material. This layer must occur beneath the water table and must overlie the aquifer. Evidence of confined conditions is not present in the Burney basin. Although poorly fractured lava flows within the aquifer system may overlie more permeable, well-fractured flows, confinement would be minimal and localized. Both the recent and older lake deposits and the older volcanic rocks slow the infiltration of surface water and the transmission of groundwater, but do not confine for the primary aquifer. The recent lake deposits overlying the primary aquifer do not provide containment of the aquifer because the lake deposits are relatively thin and lie above the water table. The older lake deposits and older volcanic rocks underlie the primary aquifer, forming a base to the aquifer system, and therefore would also not provide aquifer confinement.

The high well yields of Burney wells, coupled with the small drawdown are another indicator of unconfined aquifer conditions. Groundwater generally flows readily through unconfined fractured rock aquifers, with little drawdown, as compared to the flow of groundwater through sedimentary aquifers composed of sand, silt and clay.

For example, Burney Water District (BWD) reports that Well 7 produces 1740 gallons per minute with 2 feet of drawdown (Source Water Assessment, 1999). Drawdown in wells in a typical unconfined sedimentary aquifer would be 10 feet or more. The yield of wells does vary significantly in the wells across the basin. This variability in yield is quite typical of wells in fractured rock aquifers because productivity depends on whether a well intercepts zones of higher fracturing or not. Within highly fractured zones, a well will be highly productive in a fractured-rock aquifer.

The connectivity of the aquifer system in Burney basin is determined by the nature of the rock fractures. Like most lava flows, the Burney aquifer system is not uniformly fractured. Volcanic rock is formed when rock is heated and melted deep below the land's surface and is ejected from volcanoes or fissures as a liquid. As the liquid rock recrystallizes into solid rock, fractures form throughout the rock as it cools. Furthermore, the quicker the rock cools, the more fractures occur. As a result, cooling fractures occur throughout the volcanic rocks and connect the aquifer in Burney valley, which functions as a single aquifer system. In addition to cooling fractures, if faulting occurs after the lava has solidified (as it has in the Burney watershed), the rocks are fractured a second time. The aquifer is "better connected" and most productive where rocks are highly fractured along faults and at the head and toe of individual lava flows, where cooling is rapid.

Research (Rose, 1995 in Burney Resources Group 1999a) also indicates a high level of interconnectivity in the larger regional groundwater system. Rose demonstrates a strong correlation between groundwater discharge to springs and 1987-1992 drought in the Hat Creek area, which includes Burney basin. This correlation between drought and declining spring flows is further supported by a comparison of precipitation and groundwater levels measured in BWD Well 3 and Well 7 (CH2M Hill, 1988). Periods of high precipitation correspond to periods of high groundwater levels and periods of drought correspond to periods of low groundwater levels. Precipitation is the source of recharge to the aquifer system. An isotope analysis of the regional groundwater system by Rose (May 1995 in Burney Resources Group 1999a) indicates that the Burney watershed forms a self-contained recharge-basin within the larger Hat Creek Basin.

The study concluded that discharge from Burney Falls includes groundwater recharge from as far away as Burney Mountain and/or the northern Crater Peak area. However, both of these upland areas are within the boundaries of the Burney watershed. This study supports the assumption that precipitation within the watershed is the source of recharge to the Burney basin aquifer and Burney Falls. According to this study, rainfall and snowmelt quickly percolate into the fractured volcanic aquifer and rapidly flow through the groundwater system to discharge at Burney Falls. Based on this study, staff concludes that the source of groundwater recharge for the Burney aquifer system is precipitation that falls within the boundaries of the Burney watershed, as defined by CH2M Hill (1988) and the applicant (TMPP 1999a, Appendix J).

The correlation between groundwater levels and precipitation indicates another important aspect of the Burney aquifer system, which is the low storage capacity of

the aquifer. Typically, fractured-rock aquifers have very low storage capacity, in comparison to sedimentary aquifer systems. The amount of water that can be stored in an aquifer system depends on the amount of space between the aquifer materials. In sedimentary aquifers, water can be stored between each grain of sand. In a fractured-rock system, the water is stored between the cracks. The decline in groundwater levels during drought periods observed in the Burney basin indicates that, on the whole, the percent of space in the fractures is low as compared to the solid rock, the aquifer drains quickly, and the quantity of stored groundwater is limited.

The direction of regional groundwater flow in Burney basin is from the southern uplands, northward to Burney Falls, as described above. Burney Falls is the primary discharge point for groundwater, as well as surface water. In addition, groundwater also discharges from two smaller springs east of Burney Falls. The regional groundwater gradient is approximately 0.001 (plus or minus 0.0002). The gradient can be calculated by the difference in groundwater level(s) measured in BWD Well 7 and the elevation of Burney Falls divided by the distance from the wells to the falls.

Groundwater gradient = 3007 feet/52,800 feet = 0.001

Groundwater levels in BWD Well 7 = 3007 feet MSL (ranging from 3001 to 3016 feet)

Burney Falls discharge elevation = 2950 feet MSL, and
Distance between well and falls = 52,800 feet (10 miles).

SITE AND VICINITY DESCRIPTION

Elevations at the 40-acre site average from 3,145 feet MSL at its southern corner to 3,120 feet at the northwestern corner. The project will be located on a flat portion of the site at an elevation of 3,140 feet above MSL; this location has already been graded and leveled, and should require only minor grading. Soils at the site are primarily loams and clay loam, as represented by Burney loam/clay loams, which is a moderately deep to deep well drained brown to reddish brown loam/clay loam soil. These soils are of moderate permeability, have a low shrink-swell potential, and are only slightly susceptible to erosion (TMPP 1999a).

The 1,800 foot long route traversed by the new transmission lines will be in a north to south direction and will parallel the existing railroad right-of-way adjacent to the west side of the site, and will be constructed by PG&E according to standard design and construction practices. The route is relatively flat and undeveloped with some pine trees present, and soils expected to be similar to those on the site and in the basin. Construction of the transmission line within the existing easement will have minor environmental consequences with regard to clearing and construction.

The interconnection of the new power plant to the PG&E system will require the construction of a new 230 kV substation in the northwest corner of the site, the looping of additional power lines into the new substation, and the reconductoring of 50.5 miles of the Pit #1 Cottonwood 230 kV transmission line, 13 miles of the Pit 1-Pit 3 230kV line, and 24.5 miles of the Pit 1-Round Mountain 230 kV line. In addition, replacement of existing breakers and switches, and upgrading of the protection of the PG&E system will occur.

Vegetation at the site is sparse, although some areas have non-native and weedy species present, growing on soils derived from undifferentiated basaltic lava flows. The soils at the location of the proposed percolation ponds are generally silt and layers of fine-grained sand with scattered gravel, cobbles, and boulder-sized rock fragments, which sit on bedrock. There are two soil layers present consisting of a dark red-brown silt-like sand containing various amounts of organic matter from 3 inches to 13 inches deep. Beneath this layer is brown-red clay-like sand free of organic matter, with cobble and boulder-sized rocks increasing with depth in the lower soil layers.

The principal supplier of water for domestic use is the Burney Water District (BWD), with 1,698 connections and 411 million gallons produced in 1997 from three wells (DHS, 1999). These wells range in depth from 297 feet to 332 feet below ground surface with an average static water level of about 236 feet (TMPP 1999a).

IMPACTS

PROJECT SPECIFIC IMPACTS

EROSION AND SEDIMENTATION

Activities associated with facility construction include grading, and other earth moving activities. Removal of protective cover vegetation and disturbance of the soil surface structure leaves the soil particles vulnerable to detachment by rainfall. Grading activities may result in soil compaction, which increases stormwater runoff velocities, allowing more soil particles to be entrained in the runoff and carried off-site. Alteration of natural drainages may cause runoff to cross-exposed surfaces leading to increased erosion. Sediment carried off-site is deposited in adjacent water bodies. This may reduce drainage capacity leading to flooding or degrade sensitive biological habitats. Erosion is also a significant concern where construction of linear facilities crosses natural and man-made drainages.

As discussed above, all of the soils affected by project elements have a slight water erosion hazard. Once all vegetation is removed, all soils affected by the project should be considered vulnerable to erosion. Dewatering activities associated with power plant and gas line construction may also lead to erosion. Exposed berms and spoil piles are especially vulnerable to water erosion.

Water erosion at the site should be slight once construction is completed, since the finished site will be leveled, covered with concrete and gravel, and drainage systems will be in place. Soil erosion during and after construction will be minimized through the use of standard erosion control measures identified in the Draft Erosion Control and Storm Management Plan (Bibbs 1999).

During construction, these measures will include road and mountainous areas stabilized with gravel filler and filter fabric fencing (silt fencing), straw bales, compacted access road surfaces, and check dams. Construction stockpile materials will have filter fencing placed downslope. After final grading, exposed surfaces will be sealed or covered with an impermeable surface. Wind erosion and dust will be suppressed by watering of construction areas, soil stabilizers, mechanical sweeping, hydro-seeding, speed limits, revegetation, along with limiting activity when winds exceed 25 mph.

During project operation, wind and water action can continue to erode unprotected surfaces. An increase in the amount of impervious surfaces will increase runoff, leading to the erosion of unprotected surfaces. TMP has provided a draft Erosion Control and Stormwater Management Plan (Bibbs 1999) that identifies temporary and permanent erosion control measures at the site itself.

A natural gas pipeline is expected to extend from the site boundary in a northeastern direction, and directly south to the boundary of Carlton Enterprise, where it crosses State Route 299 in an easterly direction. It will follow a well-maintained dirt road on the east side of route SR 299 in a southeasterly direction to connect with an existing pipeline north of the pumping station. The total length of this proposed alternative is approximately 4000 feet.

Timber of undetermined acreage will have to be cleared to the south between the site and Carlton Enterprises. The remainder of the pipeline will be within areas that have previously been cleared for road easements or other purposes. However, these new areas will have to remain clear of vegetation to maintain a 10-foot buffer from the pipeline centerline.

PG& E will be constructing the natural gas line for the proposed project. The total area disturbed during gas pipeline construction is expected to exceed five acres and PG& E will have to prepare and implement a stormwater pollution prevention plan as required under the General Construction Activity Stormwater Permit issued by the State Water Resources Control Board. This draft plan does not discuss the stormwater and erosion control scheme(s) for the construction of either the natural gas pipelines and transmission lines discussed above, or the water supply pipelines discussed below, all of which are associated with the project.

WATER SUPPLY

The proposed project (TMPP 1999a) will obtain its water supply from the Burney Water District with groundwater as the source. BWD will construct and operate two new wells to be located approximately 4,700 feet from the site, which will be constructed similarly to existing wells. They are expected to produce about 1,500

gpm each, be approximately 300 feet deep, screened 100 feet below ground surface, with the annular space sealed from the surface to 50 feet below ground surface. The alternative water supply is the use of two on-site wells, which would pump water from the same aquifer as the current BWD wells, and also the same aquifer as the wells that would be installed by BWD to supply the project.

CH2M Hill (1988) performed a ground water resource evaluation of the Burney area watershed for the BWD to determine the available water supply. Lawrence and Associates (TMPP 1999a, Appendix J) updated this information.

A water budget is an accounting of inflows, outflows, consumption, and change in storage of a specified area. The Burney watershed defines the regional boundaries of the surface and groundwater system for the project.

The applicant has provided a water budget for the Burney basin, as shown in SOIL & WATER RESOURCES Table 1 below.

SOIL & WATER RESOURCES Table 1
Three Mountain Power Plant
Current Burney Basin Water Budget

All values are in acre feet per year			
Net Natural Recharge			169,000
Net Consumptive Water Use	Amount (acre-feet)	Percent of Recharge	
Domestic, urban	600	0.4%	
Domestic, rural	150	0.1%	
Industrial	1,450	0.9%	
Agricultural	17,600	10%	
Total Water Use			19,800
		89%	
Natural Discharge (rounded)			149,000

Lawrence & Associates, Workshop Exhibit, November, 1999

This table summarizes the average inflows, outflows, and consumption of the water budget for current conditions. The net natural recharge is equal to the total inflows from precipitation within the watershed, minus the amount of water that is consumed by the natural vegetation. This is the average total amount of water that naturally percolates into the groundwater system annually. Net consumptive water use is the amount of water that is consumed by evaporation or vegetation within the basin. Natural discharge is the total outflows from Burney basin from Burney Falls and from two smaller springs east of Burney Falls. Although not stated specifically, this table assumes no long-term change in the amount of groundwater stored in the basin, which also corresponds to no long-term change in groundwater levels.

The applicant has also provided a projected water budget for 2005, which incorporates the project's water use into the water budget. As indicated in SOIL

& WATER RESOURCES Table 2, TMPP will consume about 1.7 percent of the average calculated recharge of Burney basin.

**SOIL & WATER RESOURCES Table 2
Three Mountain Power Plant
Projected Burney Basin Water Budget - 2005**

All values are in acre feet per year			
Net Natural Recharge			169,000
Net Consumptive Water Use	Amount (acre-feet)	Percent of Recharge	
Domestic, urban	820	0.5%	
Domestic, rural	165	0.1%	
Three Mountain Power Plant	2,800	1.7%	
Industrial	1,450	0.9%	
Agricultural	17,700	10.0%	
Total Water Use			22,935
		86.0%	
Natural Discharge (corrected, rounded)			146,000

Lawrence & Associates, Workshop Exhibit, November, 1999

A drought-year water budget should also be constructed to clarify the impact of the project on the basin's water supply during periods of limited recharge. A water budget for a drought year(s) situation was not prepared by the applicant, as it was assumed that such large amounts of water flow through the Burney aquifer that even in drought years there would be no shortage of available water (White & Case/Cottle 1999). Staff will further evaluate the utility of conducting a drought condition water balance and address this issue in the Final Staff Assessment.

Staff recommends that the potential for water quality impacts to down-gradient wells should be evaluated in terms of the range of conditions, including conservative or "worst case" assumptions, given the uncertainty and the range of possible aquifer properties. Important properties of the aquifer that are unknown include storage capacity, hydraulic conductivity, porosity, saturated thickness and anisotropy. These aquifer properties are primary factors that would determine the travel time and dilution of the wastewater discharge.

The applicant has modeled the distribution of wastewater within the groundwater system (TMPP 1999a, Figures 10 and 11; White & Chase/Cottle 1999e, Figure 15). However, as stated by the applicant, "the intent of the model was to estimate possible effects of mixing of wastewater with groundwater." The movement and distribution of wastewater within the groundwater system represents only one possible impact. Given the uncertainty of the actual aquifer conditions that would determine the actual impacts, staff recommends that the applicant analyze the range of possible impacts that could reasonably occur, including a conservative,

“worst case” impact. Specifically, staff recommends that the applicant evaluate the impacts that would occur under aquifer conditions of lower range storage, porosity, and saturated thickness, as well as anisotropic hydraulic conductivity. In addition, data that is available and is used in the calculation of impacts must be clearly referenced (for example, geologic maps and cross-sections).

The proposed facility (TMPP 1999a) was originally estimated to require approximately 2900 acre-feet of water annually, while discharging approximately 440 acre-feet of wastewater. These volumes were later revised upward, with the project now requiring a 3500 acre-feet annual water supply, with a 760 acre-feet annual wastewater discharge (White & Case/Cottle 1999I). The available data appear to indicate that the ground water supply is adequate for both current and future uses, which includes the projects needs.

The Burney Water District provided a Will Serve letter (Burney Water District/Suppa 1999) that listed the following 5 conditions which must be met prior to BWD agreeing to provide water for the project:

1. All environmental issues must be mitigated to the satisfaction of the CEC, the Shasta County Air Quality Control Board, the California Regional Water Quality Control Board, the Shasta County Board of Supervisors, the California Department of Health Services, the California Department of Water Resources, and the Board of Directors of the Burney Water District.
2. A positive review of the Lawrence Groundwater Study by a reputable engineering firm such as CH2M Hill, Brown & Caldwell, Boyle Engineering or another firm that has expertise in groundwater evaluation with additional groundwater investigation, if necessary, to be paid for TMP.
3. The construction of two wells dedicated to the Burney Water District, each capable of producing at least 1800 gpm without interference with downstream users, and all necessary pipelines and appurtenances to loop the District's distribution system with the EDA Project. Each well will be required to have groundwater level monitoring equipment.
4. The construction of a two million-gallon water storage tank dedicated to the Burney Water District, or the oversizing of the two million-gallon tank being constructed for the EDA Project.
5. A written agreement between the Burney Water District and Three Mountain Power, giving the Board of Directors of the Water District full authority over groundwater within the boundary of the Burney Water District. This agreement shall grant the District the right to discontinue service to Three Mountain Power in the event of a water shortage or any other degradation of the Burney Groundwater Basin.

In a response to a data request from CEC staff (White & Case/Cottle 1999e), TMP has not accepted the conditions contained in the Will Serve letter, stating that the conditions must be “... clarified and accepted by Three Mountain Power.” As an

alternative, TMP will install two new wells on TMP property and provide its own water supply for the project (TMPP 1999a; White & Case/Cottle 1999e).

If BWD supplies the water to the project, it would be provided via an approximately one mile long, 24-inch diameter pipeline, and will coincide with a planned expansion of BWD's storage capacity which is primarily to increase fire fighting capability. Water entering the TMPP plant will be treated using reverse osmosis to reduce total dissolved solids, hardness and silica, and will be stored in a 500,000 gallon storage tank. This storage tank is intended to supply water in event of a supply failure, since there are currently no plans to provide a back-up water supply through additional wells.

The Burney Resources Group referenced three technical papers in a presentation at a public workshop held in Burney on November 3-4, 1999 (Burney Resources Group 1999a) and concluded that these data indicate that the groundwater aquifer proposed for use by the TMP is not recharged from precipitation falling within the Burney Basin. However, three other reports (Lawrence and Associates 1999; CH2M Hill 1988; DHS 1999) have determined that the aquifer in the Burney basin is generally unconfined, and in some instances locally semi-confined. As indicated above, staff concurs with the analysis that the aquifer is generally unconfined.

Given the high permeability of the fractured-rock aquifer system, it is unlikely that project wells will produce measurable drawdown in existing wells. However, staff recommends that the potential for well interference should be evaluated using conservative or "worst case" aquifer parameter assumptions, including anisotropy. (Anisotropy is the condition of having different properties in different directions. For example, lines of fractures can transmit drawdown farther in one direction.) The applicant has identified two municipal wells and one domestic well, located in Section 16, within a mile of the proposed well field. The location of these wells should be identified, and the potential "worst case" well interference impact on these wells should be calculated. In addition, staff recommends that the potential for well interference should be evaluated for water supply well(s) located at the project site, in the case that BWD does not provide water to the project.

WASTEWATER

The groundwater supply entering the plant will be treated with sulfuric acid and an organic phosphate solution to prevent scaling and with sodium hypochlorite to prevent biofouling. A proprietary scale inhibitor will also be added. Makeup water for the heat recovery steam generators (HRSGs) will receive additional filtration, demineralization and chemical treatment. Recoverable water cycled through the HRSGs, combustion turbines, oil/water separator and neutralization facility will be routed to the cooling tower makeup flow.

The cooling tower is anticipated to operate at minimum of 10 concentration cycles. The circulating water system will use a sulfuric acid feed to reduce alkalinity for scale control, and a scale inhibitor containing primarily organic phosphates. Biofouling in the circulating water system will be prevented using a feed of 12.5 percent sodium hypochlorite bleach. Demineralized water is cleaned up to 2

µmhos/cm using cation-anion trains, which involves caustic and acid storage (TMPP 1999a).

TMP (TMPP 1999a) has identified the anticipated chemical composition of the various liquid waste streams prior to their combination in the project's wastewater discharge (SOIL & WATER RESOURCES Table 3). These chemical compositions are based upon water quality from two existing wells at the site. Several waste streams will be produced, and include cooling tower blowdown, HRSG blowdown, and reverse osmosis reject water.

While the AFC states that wastewater from TMP will be discharged to the BWD percolation ponds, a TMP response to a data request (White & Case/Cottle 1999m; 1999e) indicates that TMP wastewater will be discharged to percolation ponds located on-site. TMP has produced and submitted a report of waste discharge document (White & Case/Cottle 1999e) to the Central Valley Regional Water Quality Control Board (CVRWQCB), where it is currently being reviewed. The wastewater discharge was originally estimated to be approximately 440 acre-feet per year (TMPP 1999a), and was later increased to approximately 760 acre-feet per year (White & Case/Cottle 1999l).

The component constituents of the wastewater discharge are listed in the AFC (TMPP 1999a) on pages 2-39 through 2-40. The report of waste discharge document produced for TMPP by Lawrence and Associates (White & Case/Cottle, 1999e) identifies a wastewater stream of 760 acre-feet per year (about 470 gallons per minute), if the plant were to operate at full capacity 24 hours per day. This cooling tower blow down wastewater is estimated to contain a total dissolved solids (TDS) concentration averaging between 900 and 1000 mg/L. The secondary state drinking water standard for TDS is 1000 mg/L. TMPP (1999a) assumed that the wastewater TDS limitation for the project would be the same as that contained in the WDR for the BWD percolation ponds. It is expected that the CVRWQCB would place discharge limitations on TDS, electrical conductivity, pH, and possibly other constituents for TMPP.

The applicant has modeled the distribution of wastewater within the groundwater system (TMPP 1999a, Figures 10 and 11, White & Case/Cottle, 1999e Report of Waste Discharge, Figure 15). Model estimates are that at depths of less than 250 feet below ground surface, TDS could be 100 mg/L above background levels at one-half mile north from the discharge site, and 50 mg/L above background at 1-mile north from the ponds. The Lawrence and Associates report identifies four wells within 1 mile of the plant, and between 1700 and 3500 feet from the ponds. It was assumed that groundwater moves to the north to northwest, and that two wells may be downgradient of the site.

SOIL & WATER RESOURCES Table 3
TMPP Estimated Wastewater Quality^{1,2}

Waste Stream	Cooling Tower	HRSG Blowdown	Multimedia Filter Reject	RO Reject	Oily Water Separator	Total Plant Wastewater
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Flow (gallons per minute)	444	25	2	11	4	466
Cations, mg/L as ion						
Calcium	61	6	12	40	3	59
Magnesium	35	3	7	23	2	34
Sodium	42	4	8	27	2	44
Potassium	10	1	2	8	1	10
Iron (ferrous)	0	0	0	0	0	0
Aluminum	0	0	0	0	0	0
Copper (cupric)	0	0	0	0	0	0
Zinc	0	0	0	0	0	0
Manganese	0	0	0	0	0	0
Ammonia	1	0	0	0	0	1
Sum of Cations	150	14	29	99	7	149
Anions, mg/L as ion						
Bicarbonate	427	40	84	278	21	415
Carbonate	0	0	0	0	0	0
Hydrate	0	0	0	0	0	0
Chloride	20	2	4	16	1	19
Fluoride	0	0	0	0	0	0
Nitrate	8	1	2	2	0	8
Phosphate	1	0	0	0	0	1
Phosphorus	0	0	0	0	0	0
Sulfate	20	2	4	13	1	25
Reactive Silica	177	17	35	114	9	172
Sum of anions	654	62	128	423	32	640
Water Treatment Chemicals, mg/L as ion						
RO antiscalant	0	0	0	6.7	0	0.2
HRSg scale inhibitor	0.3	5.0	0	0	0	0.3
Condensate corrosion agent	0	0.8	0	0	0	0
Oxygen scavenger	0	0.8	0	0	0	0
Corrosion inhibitor	25.0	0	0	0	0	23.9
Scale inhibitor	3.0	0	0	0	0	2.9
Biocide	10.0	0	0	0	0	9.5
Oil						<5
TDS, mg/L as ion	843	83	158	529	40	826

¹ Note: Based on 48°F ambient temperature and maximum duct firing

² Note: White & Case/Cottle 1999e

However, as stated by the applicant, “the intent of the model was to estimate possible effects of mixing of wastewater with groundwater.” The movement and distribution of wastewater within the groundwater system represents only one possible impact. Given the uncertainty of the aquifer conditions that would determine the actual impacts, staff recommends that the applicant analyze the range of possible impacts that could reasonably occur, including a conservative, “worst case” impact. Specifically, staff recommends that the applicant evaluate the impacts that would occur under aquifer conditions of lower range storage, porosity, and saturated thickness, as well as anisotropic hydraulic conductivity. In addition, data that is available and is used in the calculation of impacts must be clearly referenced (for example, geologic maps and cross-sections).

TMPP has proposed one alternative to alter the wastewater discharge to that proposed in the AFC. This alternative is a single stage of pretreatment using reverse osmosis, rather than the two stages of pretreatment using reverse osmosis currently proposed. However, this alternative approach increases the process wastewater discharge, which is mostly from the cooling tower blow down, from 288 gallons per minute to 740 gallons per minute, or by about a factor of 2.6. The operating pressures and efficiency of the reverse osmosis units appear to be low, however, they were not discussed in detail by the applicant. Substances contained in supply water will be concentrated depending on the number of times it is cycled through the cooling system, and will result in higher concentrations in the wastewater.

The water supply needs would also increase from an average of about 1,900 gallons per minute to 2,300 gallons per minute with this alternative. Initially, the AFC identified the only other practical wastewater disposal option to be piping it to the BWD percolation ponds (TMPP 1999a). It is not clear if the increase in water use estimates (from 2900 acre-feet/year to 3500 acre-feet/year) along with the resulting increase in wastewater discharge of 440 acre-feet/year to 760 acre-feet/year have been incorporated into these estimates.

The quality of the water supplied to the project was estimated based on water sampled from the existing Burney Mountain Power well. Ground water quality within the Burney Basin does vary (White & Case/Cottle 1999f), with the wells at Johnson Park having somewhat poorer water quality than either BWD or Burney Mountain Power wells. Since the proposed wells have not been constructed, projected water quality data from other wells in the area must be considered as an estimate. For example, the Lawrence and Associates report (1999) indicates that the BWD wells have an average TDS concentration of 76 mg/L while the Johnson Park and Burney Mountain Power wells have average TDS concentrations of 220 mg/L and 126 mg/L, respectively.

The detection limits listed in the AFC (TMPP 1999a), the Lawrence and Associates (1999) report, and in TMPP responses to a data request, (White & Cottle/Case 1999e), are somewhat higher than would be expected for groundwater of good quality. This is particularly true for several constituents listed as "not-detected," which includes ferrous iron, aluminum, barium, copper (cuprous), zinc, lead, and manganese (manganous). For some constituents the detection limit is much higher than those routinely achieved by commonly used, commercial laboratory methods (for example, USEPA Method 200.8 Inductively Coupled Plasma–Mass Spectroscopy), by factors of 100 times for barium, 50 times for zinc and copper, 30 times for manganese, 20 times for iron, and 5 times for lead.

As a result of using high analytical detection limits, the data presented by TMPP for these substances cannot be considered adequate. This is because concentrations of constituents including metals in the cooling makeup water will be significantly concentrated after going through the 10 cycles of concentration currently proposed for the project. Therefore, non-detection of a metal, for example, only indicates that it is below this level, not that it isn't present. A worse case analysis could then be a concentration ten times the detection limit.

The proposed project will be required to receive Waste Discharge Requirements (WDRs). TMP has prepared a report of waste discharge that has been submitted to the Central Valley Regional Water Quality Control Board (White & Case/Cottle 1999e), which is currently reviewing the application.

The applicant has identified most of the potential adverse impacts of the proposed project, including impacts to the water supply, well interference, and water quality. Issues of concern raised by intervenors include the water requirements of the project relative to the annual yield of the basin, potential well interference between the project wells and existing wells, potential water quality impacts to existing wells down gradient of the proposed wastewater ponds, the potential for an increase in flooding that might be caused by discharge from wastewater ponds.

Specifically, a “worst case” water quality scenario should be analyzed using conservative aquifer parameter assumptions. Secondly, the potential for contamination, of water from these wells, by wastewater from the percolation ponds will be greater if the project uses wells on-site. The depletion of the water supply, well interference, and reduction of flows at Burney Falls should be quantified, but are unlikely to be significant.

Special care must be taken to protect the water quality of the Burney groundwater system for several reasons. The Burney groundwater system is the sole source of water for domestic drinking water supplies for the inhabitants of the region. Because groundwater springs feed the flow of Burney Creek during the dry season, the aquifer system is the sole year-round source of water for all uses in the valley. Because water rapidly percolates to the aquifer system with little or no filtration through soils, the Burney aquifer is especially vulnerable to contamination. The aquifer system is well connected and groundwater travels rapidly through the aquifer (Rose, 1995 in Burney Resource/Group/Crockett 1999a). Contamination introduced into the groundwater system could move quickly through the aquifer system. Cones of depression from well drawdown are very small (BWD, Source Water Assessment, 1999), so containment of contamination with typical capture-zone pumping methods would be impractical.

DRAINAGE

The current drainage system is designed to contain on-site the flow expected from a 10-year storm prior to the construction of the TMP facility. The runoff is now contained in a pit-like depression at the northwest area of the site. Outflow from this pit is controlled through the use of a restrictor plant which releases only water of a volume corresponding to a 10-year storm flow of 2.11 cubic feet per second (cfs). Discharge from the pipe is directed to the existing railroad drainage culvert. Flow associated with a 100-year storm in excess of 2.11 cfs is stored in the pit at the northwest corner of the site, which is about 150 feet by 200 feet with a depth ranging from 1.3 feet to 0 feet.

TMP indicated that the 2.11-cfs stormwater flow is pre-project (currently existing conditions). It is stated that a less than 10-year storm may be retained and evaporated (and presumably also percolate) if the height of the water does not

exceed the invert elevation (1 foot above the bottom of the retention pond) of the discharge pipe. Discussions or calculations quantifying the volume of water expected during these events relative to the storage capacity of the detention pond were not provided.

CUMULATIVE IMPACTS

TMPP may contribute to adverse cumulative impacts to erosion, groundwater supplies, groundwater quality, and increased drainage. The proposed project will also add to the cumulative reduction in surface water flow from the Burney Falls. According to the applicant's water budget for current conditions, human activities in Burney basin have reduced the annual discharge at Burney Falls by about 12 percent. The project will reduce the discharge of water at Burney Falls and nearby springs by an additional 1.7- percent, approximately 2,800 acre-feet a year.

FACILITY CLOSURE

Typically, closure raises concerns in regard to potential erosion. Since, however, there should be no significant cut and fill slopes vulnerable to erosion, this is not a significant concern for the project. In addition, groundwater wells to be used by the project will be closed following DWR procedures, minimizing groundwater contamination and safety issues. BWD would operate the wells, which would be closed according to DWR requirements.

MITIGATION

APPLICANT'S MITIGATION

TMP has submitted a draft Erosion Control and Stormwater Management Plan (Bibbs 1999), which also discusses the revegetation of the TMPP site post construction. The draft plan identifies both temporary and permanent erosion control measures for both construction and operation of the power plant site. Temporary construction measures are intended to control the flow of stormwater runoff across disturbed areas. Temporary drainage facilities will be sized to accommodate a 10-year, 24-hour storm (TMPP 1999a). To ensure sediment does not leave the site, silt fences, straw bales straw check dams, and storm drain inlet protection will be used. Dust control will be also implemented. The plan also proposes revegetation of certain disturbed areas.

Water quality mitigation measures include curbs or dikes around all hazardous chemical storage facilities to control accidental discharges (TMPP 1999a). Materials/supplies transfer pads of a volume to hold a maximum spill along with containment sumps will also be used. In addition, TMPP will comply with NPDES permit requirements for wastewater and storm water discharges during operation. The permit will include wastewater discharge standards for constituents of concern and monitoring measures to insure compliance with these standards.

STAFF'S MITIGATION MEASURES

Staff has insufficient information to recommend any conditions of certification. These measures will be identified in the Final Staff Assessment. One mitigation measure staff will discuss is the need for a groundwater-monitoring plan which is necessary to ensure the success of mitigation requirements.

An important component of determining the effectiveness of project safeguards, compliance with project conditions and the occurrence of unexpected impacts will be the implementation of a groundwater-monitoring plan. Baseline groundwater conditions must be established prior to the start-up of the project. The applicant has identified 26 domestic wells that are within 2 miles or closer to the proposed wastewater discharge ponds (AFC, Well-log summary). (Wells are located in T35N R3E, Sections 3,4, 5, and 9.) Given the proximity and potential for impact to these wells, every effort should be made to identify well locations and operating status. A plan for sampling the water quality and water levels of these wells prior to the start of the project to establish baseline conditions is needed. A plan is also needed for monitoring groundwater on an ongoing basis once the plant begins operation.

COMPLIANCE WITH APPLICABLE LORS

In this section staff addresses the compliance of the proposed TMPP project with applicable laws, ordinances and standards, including compliance with State Water Resources Control Board (SWRCB) Policy 75-58, entitled Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling.

SWRCB POLICY 75-58

This policy states that the source of power plant cooling water should come from the following sources in order of priority:

1. Wastewater being discharged to the ocean.
2. Ocean water.
3. Brackish water from natural sources or irrigation returns flow.
4. Inland wastewaters of low total dissolved solids.
5. Other inland waters.

Clearly, the first two sources listed are not reasonable options for the proposed project. Nor does irrigation return flows represent a reliable or sufficient water source. Wastewater treatment effluent is also likely not available in sufficient quantities. Furthermore, this water would need to be treated to tertiary levels before use as cooling tower make-up. Staff is not aware of natural sources of brackish water within the area and irrigation return flows if of sufficient volume are only seasonally available. Staff is not aware of other wastewater streams in the project vicinity that are anywhere near sufficient in volume for project use. Sources of inland water within the project vicinity other than the proposed groundwater are

limited to surface water flows diversion of which would likely have greater environmental impacts than the proposed source.

DRY AND WET/DRY COOLING

SWRCB Policy 75-58 also states that "...studies associated with power plants should include an analysis of the cost and water use associated with the use of alternative cooling facilities employing dry, or wet/dry modes of operation."

Cooling towers reject heat from a power plant's steam cycle to condense the steam exiting the steam turbine and to maintain the lowest possible condenser vacuum. The heat rejection mechanism in wet cooling towers is primarily the evaporation of water to the atmosphere. Dry cooling towers transfer heat consecutively through heat exchangers, while wet/dry hybrid cooling towers use combinations of the two mechanisms to reject heat to the atmosphere.

Cooling towers use forced or induced draft to move ambient air through the tower. The ambient air temperature, humidity, velocity, and mass flow rate affect the heat transfer rate and, ultimately, the efficiency of the cooling tower. The cooling tower heat rejection efficiency and pump and fan loading affect the overall power plant thermal efficiency and output.

The fundamental differences between wet, wet/dry hybrid, and dry cooling towers are initial capital costs and heat rejection effectiveness. Dry cooling towers are two to three times more expensive than a wet system. Hybrid systems fall in the range between the two, depending upon the ratio of "wet to dry" cooling in the hybrid design. In general, the cost differences are due to the dry condenser, or heat exchanger, and taller and larger structures for dry and hybrid cooling systems.

Despite the significant cost differences, dry and hybrid cooling systems are occasionally employed because they use less water and reduce the occurrence of visible plumes compared to wet systems. For the Sutter Power Project (97-AFC-2), a combined cycle project, the switch from conventional wet cooling towers to dry cooling represented a 95 percent reduction in project water demand. For wet/dry hybrid systems, the reduction in water use is dependent upon the percentage of dry versus wet.

Dry and hybrid cooling systems are, however, less efficient in rejecting heat, and generally have higher parasitic (fan) electrical loads and can create a higher pressure (temperature) in the steam turbine condenser. Both of these factors decrease the thermal efficiency and power output of the project.

The effects are not as significant on a combined cycle project as compared to a steam-cycle only project, in that the cooling system only affects the steam side of the combined cycle project and not the performance of the gas turbine. The effect would be greater at higher ambient temperatures because the relationship is non-linear. Additional fuel can be burned to overcome some or all of the loss of output, but the fuel will be an additional operating cost and will produce additional air pollutant emissions. Other characteristics include, for example, higher noise

impacts for dry or hybrid cooling systems relative to a wet system due to larger fans to move more ambient air through the tower.

A comparison of dry, hybrid, and wet cooling towers ultimately depends on the specific needs of the proposed application. Dry and hybrid-cooling systems provide benefits in the areas of water use and plume visibility, but with some performance degradation and additional costs. Additionally, dry and hybrid cooling can be noisier, use additional fuel, or be a more visually obtrusive structure.

The policy states that, where the SWRCB has jurisdiction, use of fresh inland waters for power plant cooling will be approved only when it is demonstrated that the use of other water sources or other methods of cooling are environmentally undesirable or economically unsound. Based upon the use of dry cooling by other existing and proposed power plants here in California and elsewhere, the use of dry cooling or wet/dry cooling is technologically feasible.

The associated increases in capital costs and efficiency losses with use of either alternative cooling technology have been identified by TMPP. TMPP prepared efficiency/operational water use, wastewater discharge, and cost factor evaluations for water/evaporative (wet cooling), wet/dry hybrid, and for dry/air-cooled options. These evaluations were based on a 100 percent load. Costs for installing wet cooling was estimated at \$9.4 M, with wet dry/hybrid being 62 percent more than wet cooling, and dry cooling being 300 percent more than wet cooling.

Compared to wet cooling, efficiency losses for wet-dry hybrid and dry cooling were 3 percent and 5 percent, respectively. Water usage/wastewater discharge (gallons per minute) at an ambient air temperature of 98°F was 3155/661 for wet cooling, 2755/586 for wet/dry hybrid, and 150/61 for dry cooling.

Under implementation, the policy also states that "Proposals to utilize unlined evaporation ponds for final disposal of blowdown water must include alternative methods of disposal." TMPP has not identified any alternative disposal methods, such as the use of crystallization, treatment and recycling or other methods of wastewater disposal. Energy Commission staff will work closely with staff of the Central Valley Regional Water Quality Control Board to evaluate these alternatives.

CONCLUSIONS AND RECOMMENDATIONS

Staff does not have sufficient information at this time to reach any conclusions or make any recommendations, except to identify information that is still needed for staff to finish its analysis.

For soil resources, TMP must submit a stormwater management and erosion control plan for the linear facilities associated with the TMPP, which include the construction of the gas pipelines, electrical transmission lines, the reconductoring of existing transmission lines, and water supply and domestic waste pipelines should be submitted to the CEC when as soon as possible. Without this information, Staff is unable to conclude that the project will not cause a significant environmental

impact to soil resources and whether the project will comply with applicable soil and stormwater water related LORS.

Regarding water resources, the TMPP water supply requirements have increased over 20 percent, and the wastewater discharge volume increased over 70 percent from the values provided in the AFC (TMPP 1999a). Therefore, a new water balance for the project that details where the changes in both water use and wastewater discharges have occurred, and what processes have been affected. The significant increase in the wastewater volume on the estimates of the area requirements for the lined evaporation ponds, and for the proposed percolation ponds has not been accomplished, nor have any additional impacts to downgradient water quality been estimated.

An evaluation of the currently proposed new project well's ability to meet this increased water supply need has been estimated but not field tested. The ability of the groundwater aquifer to meet the water needs of the project requires further study. The source of the water for the project, the BWD wells, have not been constructed, nor have aquifer pumping tests or well interference tests been conducted. However, the applicant has proposed a protocol for aquifer testing, as described in their reply to CEC staff data request 53.

Staff recommends two adds to the protocol: (1) The observation well must be located close enough to the test well to experience measurable drawdown. (2) In order to minimize the effect of recharge on the measured change in groundwater levels, discharged water from the aquifer test must be piped (a) in the opposite direction from the well as the direction of the observation well and/or (b) at least twice the distance from the well as the calculated distance of significant drawdown. Recharge from the discharged water will mound symmetrically within the groundwater system beneath the point of recharge. The recharged water will flow toward the well, whether the well is upgradient or downgradient from the point of discharge.

The potential for well interference of existing wells caused by increased pumping resulting from the proposed new wells should be evaluated under conservative or "worst case" aquifer parameters, to include anisotropy. This includes existing nearby wells, and also for the case of TMP installing the new wells on site rather than having BWD supply the project from off-site wells.

The discharge of wastewater to the percolation ponds to be constructed on the TMPP site has several issues still requiring resolution. At this time, it is uncertain whether or not the Central Valley Regional Water Quality Control Board will allow the discharge as proposed without modifications to the TMPP design. TMP has not considered alternative means of either reducing water supply needs, primarily through the use of more water conservative cooling options, or reducing either the volume or the concentrations of chemical constituents (TDS for example) contained in the wastewater discharge, both of which are unresolved issues.

With regard to the proposed waste-water discharge to the percolation ponds, the range of possible impacts that could reasonably be expected to occur in a "worst

case" scenario, which includes a lower than expected range of aquifer storage capacity, porosity, saturated thickness, as well anisotropic hydraulic conductivity should be estimated.

The performance and operating specifications of the two reverse osmosis units proposed to pretreat the project's water supply should be described. These data should include, at a minimum, the operating pressure (psi), typical system recovery (percent), and system rejection of TDS (percent). The physical and chemical characteristics of the feedwater used to determine the system performance, including the TDS (percent) should be specified.

A monitoring plan to determine existing preproject baseline groundwater quality upgradient and downgradient of the site/percolation ponds should be conducted for selected constituents expected to be present in the wastewater discharged to the ponds. This monitoring should continue, particularly for downgradient wells, when the project is operational. Ground water levels in nearby existing wells should be determined under preproject conditions, and continued when the project becomes operational.

Should TMP supply its own water through wells located on-site, the potential for the wastewater discharged to the percolation ponds to be pulled into the on-site wells, and raise the constituents of concern in the water supplied from the wells should be estimated. Such recycling of wastewater from the percolation ponds would be expected to produce higher concentrations of wastewater constituents in the supply water, which would require removal, by the pretreatment RO systems. In such a scenario the waste streams (reject water) from the RO units would contain greater than originally estimated concentrations of constituents.

Without further information and analysis identified above, as well as input from other agencies, staff cannot reach any conclusions regarding the project's effects on water resources and thus, cannot recommend approval of the project at this time. These issues will be fully analyzed in the Final Staff Assessment (FSA).

Finally, a water quality analysis use lower detection limits is necessary to properly characterize potential water quality impacts.

REFERENCES

- Department of Health Services (DHS) 1999. Burney Water District System #4510003 Source Water Assessment. February 4, 1999
- CH2M Hill (CH2M) 1988. Groundwater Resource Evaluation of the Burney Basin. Prepared for the Burney County Water District Groundwater Investigation, Burney, California. October 1988
- White & Case (White & Case/Cottle) 1999m first Supplemental Responses of three Mountain Power to CURE Data Requests 1-75; letter dated November 10, 1999. Submitted to California Energy commission on November 12, 1999.
- Burney Resource Group (Burney Resource Group/Crockett) 1999a. Water Studies; letter dated November 8, 1999. Submitted to California energy commission on November 10, 1999.
- Bibbs and Associates (Bibbs) 1999 Three Mountain Power Project Draft Erosion Control and Stormwater Management Plan. Bibbs and Associates, Inc., Pasadena, California. October 13, 1999

ALTERNATIVES

Gary Walker and Lance Shaw

PURPOSE OF THE ALTERNATIVES ANALYSIS

The purpose of staff's alternatives analysis is to provide the Energy Commission with an analysis of a reasonable range of alternatives that could avoid or substantially lessen any potentially significant adverse impacts of the proposed project. (Cal. Code Regs., tit. 14, §15126(d)) (Cal. Code Regs., tit. 20, § 1765) This analysis identifies the potential significant environmental impacts of the proposed project, and discusses technology and site alternatives and their ability to reduce or avoid potential significant impacts of the proposed project.

LEGAL GUIDANCE FOR ALTERNATIVES ANALYSIS

The "Guidelines for Implementation of the California Environmental Quality Act" (CEQA), Title 14, California Code of Regulations Section 15126(d), provide direction by requiring an evaluation of the comparative merits of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the project objectives." In addition, the analysis must address the "No project" alternative (Cal. Code Regs., tit. 14, §15126(d)).

The range of alternatives is governed by the "Rule of reason" which requires consideration only of those alternatives necessary to permit informed decision-making and public participation. CEQA states that an environmental document does not have to consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative. (Cal. Code Regs., tit. 14, § 15125(d)(5)). However, if the range of alternatives is defined too narrowly, the analysis may be inadequate. (*City of Santee v. County of San Diego* (4th Dist. 1989) 214 Cal.App. 3d 1438).

ALTERNATIVES ANALYSIS METHODOLOGY

To prepare this alternatives analysis, the staff used the methodology summarized below:

1. Describe the project objectives.
2. Identify any potential significant environmental impacts of the project.
3. Evaluate the environmental impacts of not constructing the project to determine whether the "No project" alternative is superior to the project as proposed.
4. Evaluate alternative technologies.
5. Determine which, if any, of the potential significant impacts could potentially be avoided by use of an alternative site.
6. Develop screening criteria for feasibility of alternative sites.

7. Select a reasonable range of alternative sites that:
 - a. Meet most of the basic objectives of the project.
 - b. Avoid or substantially lessen one or more of the potential significant effects of the project.
 - c. Satisfy the feasibility screening criteria.
8. If any alternative sites are deemed infeasible, explain why.
9. Evaluate the environmental impacts of each feasible alternative site.
10. Compare the environmental impacts of the alternative sites with the proposed project to determine whether the environmental impacts of the alternative are the same, better, or worse than the proposed project.

IMPLEMENTATION OF STAFF'S ALTERNATIVES ANALYSIS

PROJECT OBJECTIVES

The Application states that the project has the following objectives:

1. To minimize the miles of new transmission line construction required to connect with the existing PG&E 230 kV transmission line. (This does not include the 60 linear miles of reconductoring of PG&E's transmission lines.)
2. To expedite construction and operation schedules by using an existing site under Three Mountain Power, LLC's control.
3. To use a readily available, secure water supply for the facility's cooling water, and a readily available means of handling wastewater discharge.
4. To maximize compatibility with existing land use and zoning.
5. To minimize the construction distance of the natural gas tie-in line to the PG&E natural gas transmission line.
6. To minimize the project's visibility and impacts on visual resources.
7. To maximize local community acceptability with consideration of noise, public health, worker safety, and hazardous materials handling issues.
8. To minimize the impact on endangered species and their habitats. (This does not include the reconductoring of the 60 linear miles of PG&E's transmission lines.)
9. To use a site with appropriate geological conditions, including geotechnical compatibility and consideration of local floodplain characteristics.
10. To minimize the impacts on cultural resources. (However, the AFC mentions that the proposed plant site and linear routes are considered to be highly sensitive for cultural resources.)
11. To maximize the project's ability to meet air quality requirements.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS

Staff has not completed its evaluation of the potential significant environmental effects of the project. However, because of the schedule limitations of the siting process, staff has proceeded based on the preliminary identification of the potential significant environmental effects of the project. The environmental consequences of the proposal are discussed in more detail in the individual sections of the Preliminary Staff Assessment. Staff believes that potentially significant impacts may occur in the air quality, water resources, biological resources, and cultural resources areas.

AIR QUALITY

The proposed project may contribute to significant local air quality impacts due to emissions of particulate matter 10 microns or smaller in size (PM₁₀). Although the applicant has committed to offsetting with credits, the credits may not be available within the Burney Basin. Staff believes that the local air quality impacts need to be mitigated with local emission reductions, or offsets.

WATER RESOURCES

The proposed project may cause a significant effect on ground water quality due to disposal of wastewater in the proposed percolation ponds.

BIOLOGICAL RESOURCES

The proposed project may have significant impacts to wildlife due to toxic levels of constituents in the wastewater percolation ponds.

CULTURAL RESOURCES

Sensitivity for cultural resources is high at the proposed power plant site, so the project may cause significant cultural resource impacts at the site. Significant cultural resources exist within and near the right-of-way for the 60 miles of existing transmission line that would be reconductored. Therefore, this part of the project may cause significant cultural resource impacts.

THE “NO PROJECT” ALTERNATIVE

CEQA Guidelines and Energy Commission regulations require consideration of the "no project" alternative. This alternative assumes that the project is not built. It is compared to the proposed project and determined to be superior, equivalent, or inferior to it.

In the AFC (TMPP 1999a, pp.5-10 through 5-11) the applicant stated that if the TMPP is not constructed as planned, additional generation would be needed to supply the 6,737 MW demand projected by the Energy Commission. The AFC further stated that if the TMPP were not built at the proposed site, other facilities required to meet this need may be planned for sites that are not as suitable from an environmental standpoint as the proposed project.

Not constructing and operating the proposed TMPP project would avoid all environmental impacts that the project would create. The avoidance of the potential

air quality, water quality, biological resources, and cultural resources impacts may make the "no project" alternative environmentally superior to the proposed project. The limitation on mitigation options for air quality impacts is specific to the Burney region because that region lacks local air emission offsets. Staff knows that offsets are more readily available in many other parts of the state. Other merchant power plant developers have discussed possibilities for at least 14 large (i.e., 300 MW or greater) projects with the Energy Commission staff. Therefore if the TMPP is not built, there is no shortage of alternatives for providing electricity and system reliability. In addition, most, if not all, other projects are likely to be located closer to major load centers in the state, reducing transmission losses. However, each of the projects that will be built is likely to differ substantially in the particular potential impacts that it has the potential to cause, primarily because of site-specific conditions. In addition, it is not possible to identify a particular project that would be built if TMPP were not built. Therefore the conclusion that the "no project" alternative would be environmentally superior to the proposed project is tentative.

TECHNOLOGY ALTERNATIVES

DEMAND SIDE MANAGEMENT

One alternative to a power generation project could be programs to reduce energy consumption. These programs are typically called "energy efficiency," "conservation," or "demand side management" programs. One goal of these programs is to reduce overall electricity use; some programs also attempt to shift such energy use to off-peak periods.

The Energy Commission is responsible for several such programs, the most notable of which are energy efficiency standards for new buildings and for major appliances. The California Public Utilities Commission supervises various demand side management programs administered by the regulated monopolies, and many municipal electric utilities have their own demand side management programs. The combination of these programs constitutes the most ambitious overall approach to reducing electricity demand administered by any state in the nation.

The Energy Commission is also responsible for determining what the state's energy needs are in the future, using 5 and 12 year forecasts of both energy supply and demand. The Commission calculates the energy use reduction measures discussed above into these forecasts when determining what future electricity needs are, and how much additional generation will be necessary to satisfy the state's needs.

Having considered all of the demand side management that is "reasonably expected to occur" in its forecasts, the agency then determines how much electricity is needed. The most recent estimation of electricity needs is found in the 1996 Electricity Report.

The Warren-Alquist Act prohibits the agency, in its alternatives analysis, from considering such conservation programs to be alternatives to a proposed generation project. (Pub. Resources Code, Section 25305(c).) This is because the

approximate effect of such programs has already been accounted for in the agency's "integrated assessment of need," and the programs would not in themselves be sufficient to substitute for the additional generation calculated to be needed.

The Warren-Alquist Act was amended in 1999 to delete the necessity of a Commission finding of "need" in power plant licensing cases. Nevertheless, the Commission's most recent need determination, adopted in 1997, makes it abundantly clear that conservation programs alone can not displace the need for power generation for California's growing economy.

RENEWABLE RESOURCES

Staff examined the principal electricity generation technologies that could serve as alternatives to the proposed project and do not burn fossil fuels. These technologies are geothermal, solar, hydroelectric, wind, and biomass. Each of these technologies could be attractive from an environmental perspective because of the absence or reduced level of air pollutant emissions. However, these technologies also cause environmental consequences and have feasibility problems.

Solar, wind, and hydroelectric resources require large land areas in order to generate 500 megawatts of electricity. Specifically, centralized solar projects using the parabolic trough technology require approximately 5 acres per megawatt. This 500 MW plant would require approximately 2,500 acres. Photovoltaic arrays require similar acreage per megawatt. Centralized wind generation areas generally require 40-50 acres per megawatt, with 500 megawatts requiring 20,000 - 25,000 acres. Large hydroelectric facilities generating 500 megawatts would inundate at least 30,000 acres with water. These technologies have the potential to cause significant land use, biological, cultural resource, and visual impacts. In summary, staff does not believe that these alternatives would be environmentally preferable to the proposed project.

Severe resource constraints also exist for most of the renewable technologies. Geothermal resources sufficient to generate substantial amounts of electricity are not available. Opportunities for new hydroelectric, wind, or biomass generation are very limited.

Staff also considered the alternative of a biomass facility. However, biomass facilities are generally in the 3 to 10 MW range, must overcome significant fuel source reliability issues, have difficulty being economically competitive, and are typically worse from an air quality perspective than natural gas. For these reasons such a project would not be a feasible alternative, nor would it be likely to sufficiently satisfy project goals.

A downsized facility, rather than one that is 500 MW, would be consistent with at least some of the project goals identified above. However, even a 100 MW facility would be subject to the same environmental and feasibility problems identified

above regarding available sites, land use, biological, and cultural resource impacts, and sufficient fuel resources.

ADDITIONAL TECHNOLOGICAL ALTERNATIVES

Staff is considering additional technological alternatives in certain topic areas to mitigate potential significant impacts. In particular, staff is evaluating dry cooling to mitigate potential water supply impacts, and treatment systems to address potential water quality impacts (see the **Water Resources** section of the Preliminary Staff Assessment). Staff will present its completed evaluation in the Final Staff Assessment.

POTENTIAL SIGNIFICANT IMPACTS THAT COULD POTENTIALLY BE AVOIDED BY USE OF AN ALTERNATIVE SITE

Because all of the proposed project's potential significant environmental impacts (discussed above) are site specific, use of an alternative site may avoid or substantially lessen any of the impacts.

ALTERNATIVE SITE SCREENING ANALYSIS

ALTERNATIVE SITE SCREENING CRITERIA

Staff has considered the following five screening criteria in identifying alternative sites.

1. Site suitability. Approximately 13 acres are required for the site. The shape of the site also affects its usability.
2. Availability of infrastructure. The site should be within a reasonable distance of the electric transmission system, natural gas supply, and water supply.
3. Availability of the site.
4. General Plan and zoning consistency.
5. Not located adjacent to moderate or high density residential areas or to sensitive receptors (such as schools and hospitals) or to recreation areas.

ALTERNATIVE SITES

Alternative sites were identified through independent staff investigations. Staff contacted local governments and commercial/industrial real estate brokers and made field visits. To date, no public comments or suggestions have been received on alternative sites.

Staff identified sites in four geographical areas that meet most project objectives relevant to an alternative site analysis, satisfy the site feasibility criteria, and could avoid or substantially reduce at least one of the potential environmental impacts of the proposed project. The sites are located in the following areas (see **ALTERNATIVES Figure 1**):

ALTERNATIVES Figure 1
Alternative Sites

- In Shasta County south of the City of Anderson (several parcels)
- In Glenn County west of the City of Willows (one parcel)
- In Colusa County south of the community of Maxwell (several parcels)
- In Colusa County in the City of Williams (several parcels)

Staff has also reviewed the information in the AFC regarding the two alternative sites that the applicant considered (TMPP 1999a, pp.5-3 through 5-8). Staff agrees with the applicant that use of either of the alternative sites identified in the application has more potential to cause significant environmental impacts than the proposed site. Therefore, staff will not conduct a detailed evaluation of those sites.

ALTERNATIVE SITE SELECTION PROCESS

Staff considered the following factors in selecting alternative sites:

MEET MOST OF THE BASIC OBJECTIVES OF THE PROJECT.

Staff has made the following determinations regarding the extent to which alternative sites are likely to meet the eleven project objectives identified above that are relevant to alternative site selection:

1. To minimize the miles of new transmission line construction required to connect with the existing PG&E 230 kV transmission line. (This does not include the 60 linear miles of reconductoring of PG&E's transmission lines.)

The new transmission lines for each of the identified alternatives would be less than four miles long and no reconductoring would be required. Some would parallel existing transmission lines and/or roads. Staff therefore considers that the identified alternative sites satisfy this objective.

2. To expedite construction and operation schedules by using an existing site under Three Mountain Power, LLC's control.

None of the identified alternative sites are located on land under Three Mountain Power, LLC's control.

3. To use readily available, secure water supply for the facility's cooling water, and a readily available means of handling wastewater discharge.

Two of staff's alternative sites appear to have available water supplies. Staff is investigating water supply for the other two sites. Staff will investigate means of handling wastewater discharge.

4. To maximize compatibility with existing land use and zoning.

All of the alternative sites are located on land designated for heavy industrial use.

5. To minimize the construction distance of the natural gas tie-in line to the PG&E natural gas transmission line.

All of the identified alternative sites are located within four miles of a PG&E natural gas transmission line.

6. To minimize the Project's visibility and impacts on visual resources.

One of the identified alternative sites is not expected to cause significant visual impacts. The other sites may cause such impacts.

7. To maximize local community acceptability with consideration of noise, public health, worker safety, and hazardous materials handling issues.

The factors that affect worker safety issues are not site-specific, so they are not relevant to an alternative site analysis. Many of the factors that affect issues regarding noise, public health, and hazardous materials handling are also not site-specific. Of those factors that are site-specific, the most important is the proximity of a site to people who would have long-term exposure. None of the identified alternative sites are located close to moderate or high density residential areas, so the sites are acceptable in regard to this factor.

8. To minimize the impact on endangered species and their habitats. (This does not include the reconductoring of the 60 linear miles of PG&E's transmission lines.)

Staff's alternative sites appear to meet this criterion. See the following discussion regarding significant effects.

9. To use a site with appropriate geological conditions, including geotechnical compatibility and consideration of local floodplain characteristics.

None of the identified alternative sites is in a flood zone. Staff has not yet evaluated the geotechnical compatibility of the sites.

10. To minimize the impacts on cultural resources. (However, the AFC mentions that the proposed plant site and linear routes are considered to be highly sensitive for cultural resources.)

Staff's alternative sites appear to meet this criterion. See the following discussion regarding significant effects.

11. To maximize the Project's ability to meet air quality requirements.

Staff's alternative sites appear to meet this criterion. See the following discussion regarding significant effects.

Summary

The alternative sites that staff identified satisfy most (at least seven) of the eleven project objectives: numbers 1, 4, 5, 7, 8, 10, and 11. Staff will make further investigation to determine whether the alternative sites satisfy objectives 3 and 9.

AVOID OR SUBSTANTIALLY LESSEN ONE OR MORE OF THE POTENTIAL SIGNIFICANT EFFECTS OF THE PROJECT

Air Quality

All of the alternative sites that staff has identified are outside the Burney Basin. Therefore, PM₁₀ offsets would not have to come from the Burney Basin. The alternative sites are in areas with better wintertime dispersion so PM₁₀ is not as much of a concern. In addition, offsets are more likely to be available.

Water Resources

Staff has learned that water supply is available at two of the identified alternative sites. Staff will investigate further regarding the other two sites and regarding wastewater disposal.

Biological Resources

Use of any of the identified alternative sites could avoid the potential wildlife impact due to the proposed wastewater percolation ponds because water treatment facilities may be available.

Cultural Resources

Because all of staff's identified alternative sites and related water line routes are disturbed, the potential for significant cultural resource impacts is low. The natural gas line routes and electric transmission tie-in routes for three of the sites cross disturbed areas, with similar low potential. The natural gas line route and electric transmission tie-in route for one site may have higher potential; staff will investigate this further.

Summary

Use of any of staff's identified alternative sites may avoid or substantially reduce one or more of the potential significant environmental impacts of the proposed project.

SATISFY THE FEASIBILITY SCREENING CRITERIA.

Site suitability.

All of the sites are of sufficient size and appropriate shape to accommodate the project.

Availability of infrastructure.

This topic has been addressed above in regard to project objectives. Electric and gas lines are available. Staff investigations are continuing regarding water supply and waste water disposal.

Availability of the site.

Staff has investigated the availability of identified sites. All identified sites are potentially available.

General Plan and zoning consistency.

Staff has evaluated the consistency of each alternative site with the applicable general plan and zoning. Each of the sites is consistent with general plan and zoning designations.

Not located adjacent to moderate or high density residential areas or to sensitive receptors (such as schools and hospitals) or to recreation areas.

All of the identified sites satisfy this criterion.

Summary

All of the identified alternative sites satisfy four of the five screening criteria. In regard to the fifth criterion, all of the sites satisfy two of the four infrastructure needs of the project, and further staff investigation will reveal whether the sites satisfy the remaining two infrastructure needs (water supply and waste water disposal).

REMAINING STEPS

For the Final Staff Assessment, staff will complete the remaining steps of its alternatives analysis. They include:

- Conduct a more detailed evaluation of the potential environmental impacts of the identified feasible alternative sites.
- Compare the environmental impacts of the identified feasible alternative sites with the environmental impacts of the proposed project.